



BLM's Assessment, Inventory, and Monitoring Strategy

A Briefing for the
Office of Management and Budget
March 6, 2007



Briefing for the Office of Management and Budget On BLM's Assessment, Inventory, and Monitoring Strategy

New Executive Office Building Room 8116

March 7th, 2007

10:00 to 12:00

1. GOALS, FINDINGS, AND MODELS GUIDING THE AIM STRATEGY
 - Background Leading to Development of a Strategy
 - Major Findings
 - High-level goals and process models.
 - Describe relationship to DOI's Strategic Plan.
 - Describe organization of the AIM strategy into local, regional, and national management questions, and findings and recommendations.
2. LOCAL-LEVEL ACTIVITIES OF THE AIM STRATEGY
 - Data management
 - Integrating AIM Information with Land Use Planning
 - Integrating Land Health Assessments Across Programs
3. REGIONAL-LEVEL ACTIVITIES OF THE AIM STRATEGY
 - Relationship to Healthy Lands Initiative
 - Sagebrush connectivity as an example
4. NATIONAL-LEVEL ACTIVITIES OF THE AIM STRATEGY
 - Oregon Pilot
 - Rolling Up Achievement/Non-Achievement of Land Health Standards
 - LANDFIRE
5. APPENDICES FOR BACKGROUND
 - Definitions of Assessment, Inventory, and Monitoring
 - Glossary of Related Terms
 - Summary of Statutes that Guide A, I, and M
 - Manual Sections and Technical References that Guide BLM AIM Activities
 - Summary of Related OMB Findings

On the Assignment, Management, and Development of the
Bureau for the Office of Management and Budget

New Assignment - Office of Management and Budget
March 7, 1967
1967-1968

1. ANALYSIS OF THE BUREAU'S PRESENT AND FUTURE
FUNCTIONS AND THE ASSIGNMENT OF THE BUREAU

The Bureau's present functions are to provide
advice and assistance to the President and
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BLM's Assessment, Inventory, and Monitoring Strategy

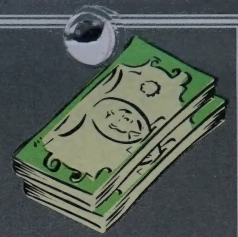
A Briefing for the
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Background - Statutory Requirements

- FLPMA, PRIA, and ESA are major statutory drivers of Inventory. The focus of these laws is on having sufficient information to make decisions.
- NEPA is the chief statutory driver of Monitoring. Some legislation specifically requires monitoring, such as HFRA.



Background - OMB Role



- The Office of Management and Budget (OMB) has required BLM to take a hard look at monitoring activities through PART analyses and budget passbacks.
- The 2005 Budget Justifications included an additional \$1.5 Million to develop a strategy.

Inter-Agency Cooperation is Essential to Success

- BLM is working closely with USGS, NPS, USFS, and NRCS in developing its AIM strategy.
- DOI is Working with CEQ to Develop 'National Indicators.'

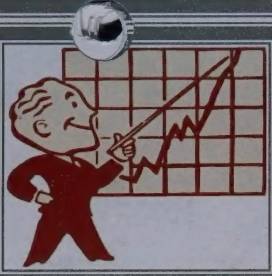


Initial Findings

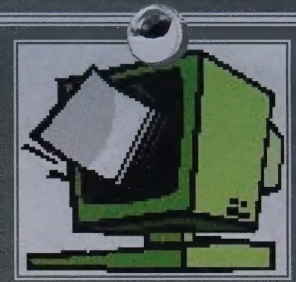
- Statutory I&M obligations could be clarified
- Monitoring commitments are not always met
- AIM is not well integrated with planning
- AIM information is driven by projects and permits, and is not managed “corporately”
- BLM lacks an inter-disciplinary process model
- AIM information is not collected, stored, or reported to allow effective sharing or reuse of information.

Initial Findings, Contd.

- There are opportunities for improvement at different scales.
- Work groups were developed at the local, regional, and national levels to address management questions at these different scales.



Initial Findings - Survey of Employees

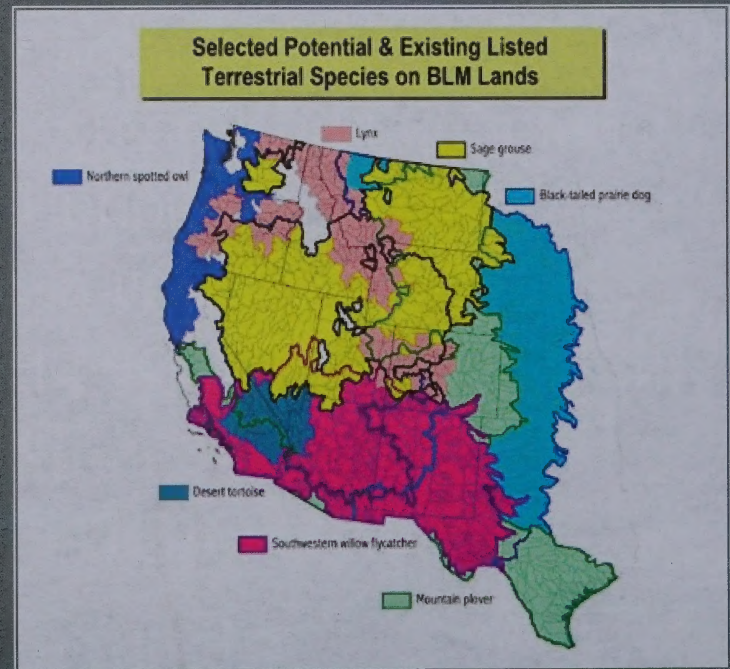


- BLM's recent survey of field activities indicates that:
 - Data collection is primarily in hard copy
 - Little subsequent transcription to DBMS
 - AIM actions are often divorced from planning
 - Little use of contractors, volunteers
 - Some programs are clear, others are not
 - Employees need guidance on remote sensing

Initial Findings - Regional Level

■ Findings:

- Scale matters, and can be better incorporated into assessments and planning
- Program ownership is obscured as information scales up, making policy development difficult.



Initial Findings - National Level

- Findings:
 - It may be difficult to aggregate information that is useful locally.
 - Options include existing systems (e.g., LANDFIRE)

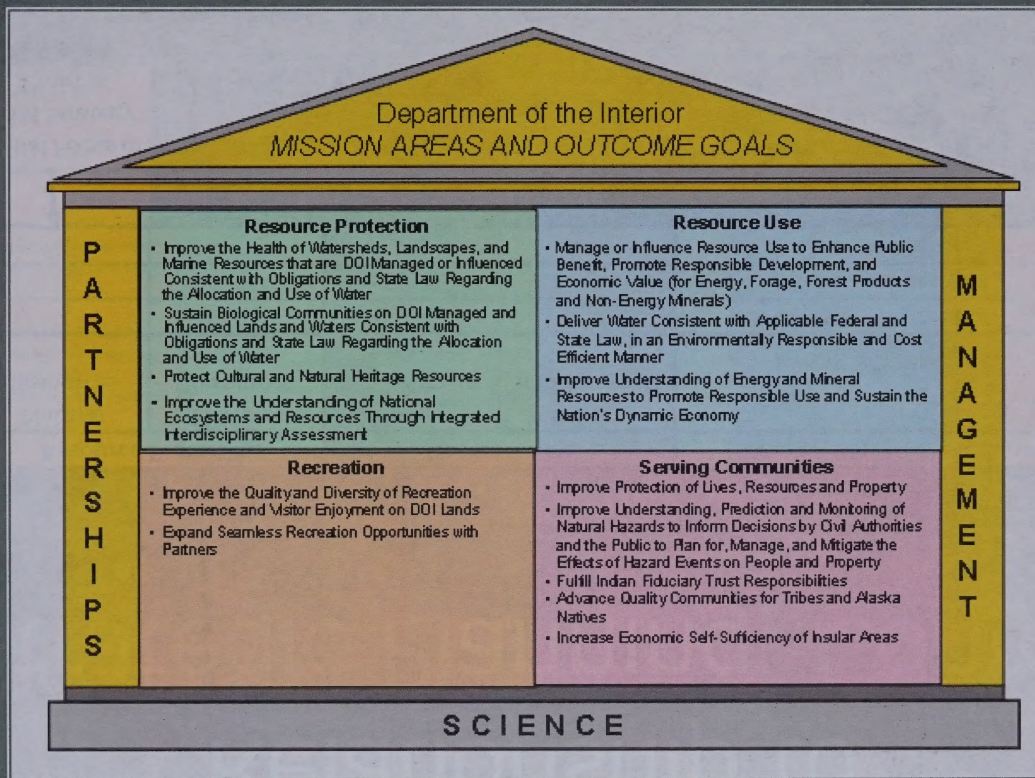


Goals of the AIM Strategy

GOALS AND OBJECTIVES OF BLM'S ASSESSMENT, INVENTORY, AND MONITORING STRATEGY

GOAL	OBJECTIVE
#1. Integrate assessments, inventories, and monitoring into BLM planning and other management decisions. (IDENTIFY MANAGEMENT NEEDS)	A. Integrate AIM information into the budget process to support resource allocation.
	B. Integrate AIM information into plan development, implementation, and effectiveness evaluation.
	C. Integrate AIM information into permitting, project development, and effectiveness evaluation.
#2. Acquire information to understand resource occurrence, condition, use, trend, and the communities that depend upon them. (ANSWER MANAGEMENT NEEDS)	A. Standardize internal data collection for multiple use and multiple scales.
	B. Use existing available data from internal and external sources.
	C. Gather new data from internal and external sources to augment existing sources.
#3. Manage and share AIM information, and report periodically on the findings from that information. (MANAGE INFORMATION)	A. Integrate data systems to use and share data across programs and offices.
	B. Mandate the use of certain systems and equipment.
	C. Develop standardized reporting formats to periodically report on occurrence, condition, and use at multiple scales.

Relationship to Strategic Planning



Relationship to Strategic Planning, Contd.

	Resource Protection		Resource Use		Recreation	Serving Communities
	Natural Resources	Heritage Resources	Forage and Forests	Energy and Minerals		
NATIONAL	X					
REGIONAL	X					
LOCAL	X					


 Initial Focus of AIM Strategy Projects

QUESTIONS TO BE ANSWERED IN IMPLEMENTING A NATIONAL MONITORING STRATEGY

GENERAL QUESTIONS	ASSESSMENT, INVENTORY, AND MONITORING	IMPLEMENTATION/ COMPLIANCE	EFFECTIVENESS	VALIDATION	ADAPTIVE MANAGEMENT
	What are resource occurrences, opportunities, conditions, trends, stressors, and challenges?	Is BLM doing what it said it would do in its decisions, and are authorized users following our requirements?	Are BLM's resource objectives being achieved as a result of its actions (e.g., authorizations, allowable uses and treatments)?	Are the conceptual models and other assumptions underlying BLM decision making correct?	If resource objectives are not being achieved, how can BLM's management be adapted to achieve the objectives?
NATIONAL SCALE	CONDITION - GENERAL	What are resource conditions and trends on the public lands?	Are actions being implemented - by BLM or by the users of the public lands - that will cause changes in condition over time? If so, could these changes in condition result in changes in use opportunities?	Are BLM's actions on the public lands effective in maintaining or improving condition over time?	Are the methodologies BLM uses to report on condition scientifically defensible, and have they been peer reviewed?
	CONDITION - BASED ON LH ASSESSMENTS	How many acres or miles are achieving the upland, riparian, water quality, and habitat quality land health fundamentals? For the acres or miles not achieving the upland, riparian, water quality, and habitat quality land health fundamentals, what are the causal factors?	Are BLM's management actions designed to cause areas meeting land health fundamentals to increase over time?	Are areas meeting land health fundamentals increasing over time?	Has the Land Health Assessment process been peer reviewed? Does the information on condition obtained through LHA square with other national-level condition information?
	EFFECTIVENESS	Are goals and objectives expressed using common measures and terminology, so that effectiveness can be demonstrated at different scales?	Is BLM implementing its land use plans (i.e., are resources allocated to meet the plans' goals and objectives)?	Are BLM's land use plans effective (i.e., are the plans' goals and objectives being realized)?	Do measures of land use plan effectiveness accurately portray BLM's contributions to natural resource condition? Can management alternatives be implemented that result in better achievement of Bureau-wide goals and objectives?

QUESTIONS TO BE ANSWERED IN IMPLEMENTING A NATIONAL MONITORING STRATEGY

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GENERAL QUESTIONS		ASSESSMENT, INVENTORY, AND MONITORING	IMPLEMENTATION/ COMPLIANCE	EFFECTIVENESS	VALIDATION	ADAPTIVE MANAGEMENT
		What are resource occurrences, opportunities, conditions, trends, stressors, and challenges?	Is BLM doing what it said it would do in its decisions, and are authorized users following our requirements?	Are BLM's resource objectives being achieved as a result of its actions (e.g., authorizations, allowable uses and treatments)?	Are the conceptual models and other assumptions underlying BLM decision making correct?	If resource objectives are not being achieved, how can BLM's management be adapted to achieve the objectives?
LOCAL SCALE	PLANS	Are ecological processes properly functioning based on kind, amount, and proportion of vegetation?				
		What is the ecological potential of the area?	Are goals and objectives written in a way that can be implemented?	Are goals and objectives being realized through benchmarks identified in the LUP/activity plan and any associated monitoring plans?	Were models (implicit or explicit) used to predict effects of the proposed Federal action accurate?	As part of plan evaluation, did the affected unit adapt its management in response to information about meeting or not meeting LUP and T&T goals and objectives?
		What is the condition of resources in the planning area?	If so, are they being implemented?			
		How should uses of those resources be allocated?	Have travel management plans been developed, and if so are they being followed?	Is travel and transportation occurring within the planning area as projected?	Are travel and transportation user needs being met?	Do monitoring results indicate the need to adjust LUPs or activity-level plans?
		Should any lands be specially managed, retained, acquired, or disposed of?				
		What is the likely effect of the proposed Federal action?				
	PERMITS	Are the activities proposed for permitting consistent with allocated uses in the LUP? If not, must the LUP be amended?				
		Are there special status species within the area proposed for permitting?	Are permit terms and conditions being met?	Does compliance with terms and conditions of permits produce the projected results?	Were models (implicit or explicit) used to predict effects of the proposed Federal action accurate?	Do changes in resource condition cause adjustment of permit terms and conditions?
		Are terms and conditions of use specified in the permit?				
		What is the likely effect of the proposed Federal action (granting the permit)?				

QUESTIONS TO BE ANSWERED IN IMPLEMENTING A NATIONAL MONITORING STRATEGY

GENERAL QUESTIONS	ASSESSMENT, INVENTORY, AND MONITORING	IMPLEMENTATION/ COMPLIANCE	EFFECTIVENESS	VALIDATION	ADAPTIVE MANAGEMENT
	What are resource occurrences, opportunities, conditions, trends, stressors, and challenges?	Is BLM doing what it said it would do in its decisions, and are authorized users following our requirements?	Are BLM's resource objectives being achieved as a result of its actions (e.g., authorizations, allowable uses and treatments)?	Are the conceptual models and other assumptions underlying BLM decision making correct?	If resource objectives are not being achieved, how can BLM's management be adapted to achieve the objectives?
PROJECTS	Does the LUP identify the need for BLM to implement a project? What project will address this need?	Was the project implemented as prescribed?	Did the project adequately address the need identified in the LUP?	Did the office that implemented the project assess whether the chosen method was most appropriate?	Did the validation of methods used cause any change in prescription for subsequent projects?

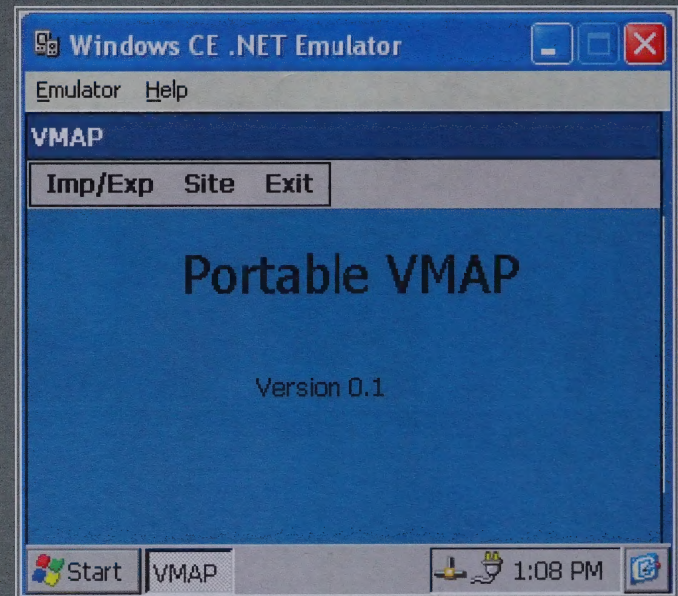
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REGIONAL SCALE	GENERAL QUESTIONS	What is the condition of key resources that BLM's decisions may cumulatively impact (e.g., air, water, wildlife habitat)? What is the nature and extent of uses on BLM lands within the affected region? To what extent do BLM projects or permitted uses contribute to changes in condition at a regional scale? Does BLM have models in place to predict changes in resource condition over time at a regional level.	Are management requirements (including mitigation measures) being implemented within the affected region? Are regional level thresholds established for changes in resource condition? Are these thresholds being approached?	Is BLM achieving its management objectives? Are the management requirements effective? Are the management requirements appropriate?	Did models that estimated effects of BLM projects and authorized uses accurately predict resource changes?	If objectives for BLM projects and mitigation of permitted uses are not being met, is BLM adapting its management actions?
	ENERGY		Are stipulations and conditions of approval being implemented? What is the extent of reclamation activities?	Are stipulations and conditions of approval effective?		If objectives for development or reclamation are not being met, is BLM adapting its management actions?
	TRAVEL AND TRANSPORTATION	Within a regional use area, where, when, and why is travel and transportation (T&T) use occurring and at what intensity?	Within a regional use area, has BLM placed requirements on T&T in its decisions?	Are BLM's management actions moving the region toward BLM's objectives?	Are T&T activities affecting other users within the region? If so, what are those activities and where are they occurring?	
	SAGEBRUSH	What is the status, distribution, and trend of sagebrush communities? What is the status, distribution and trend of invasive species or other stressors that affect sagebrush habitat?	What kind of treatments have been implemented to maintain or restore sagebrush habitat integrity, and where have they been implemented?	Do targeted treatments increase or improve sagebrush habitat at a regional level?		





■ Data Management/ Business Process Re-Engineering



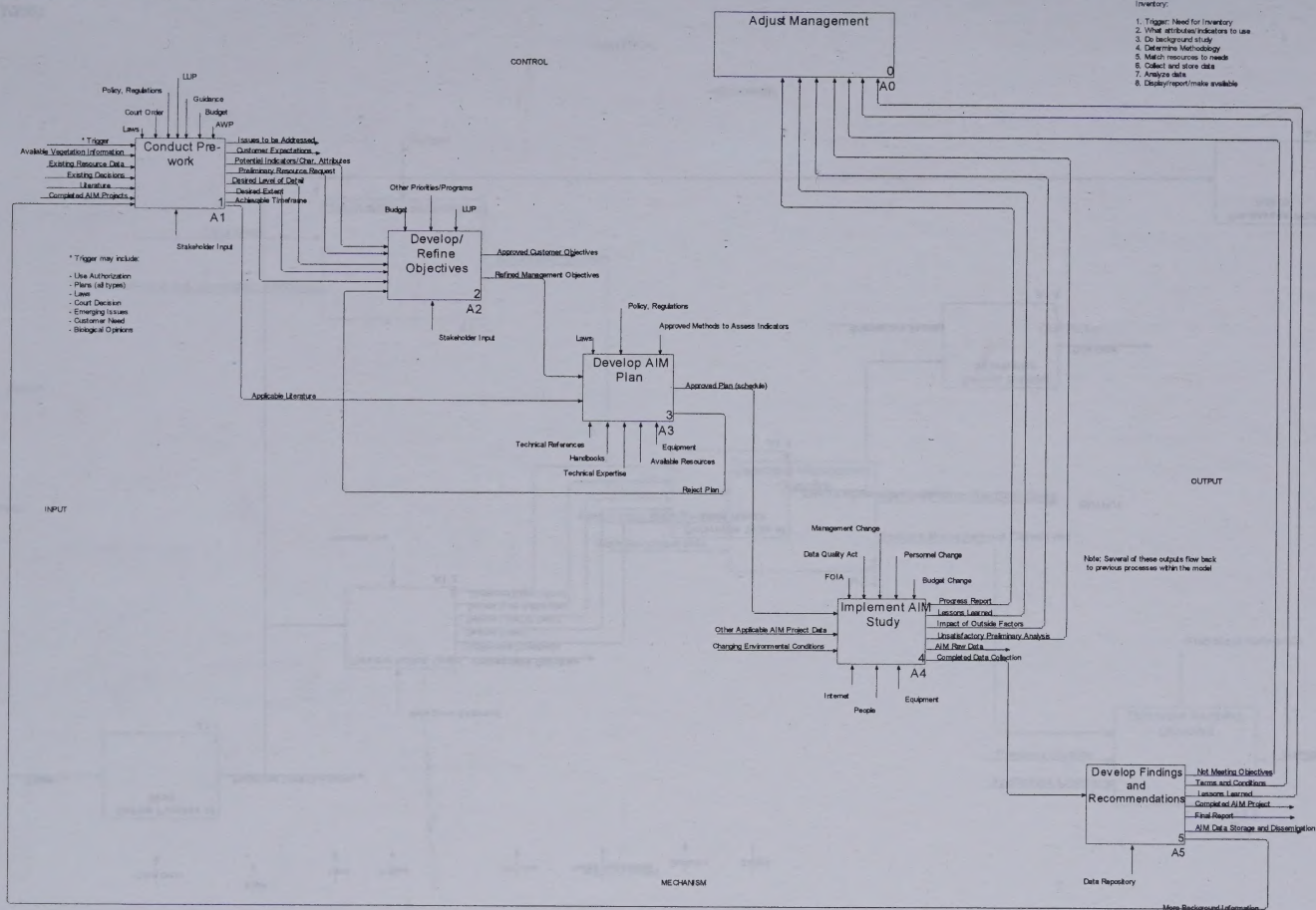
- Incorporation of remotely sensed information



(Examples of remotely sensed images at different resolutions)

Assessment, Inventoring, and Monitoring (AIM) Draft Process Model

1/10/07



02/13/2007

A1 Conduct Pre-Work

CONTROL

Court Order

AWP

Laws

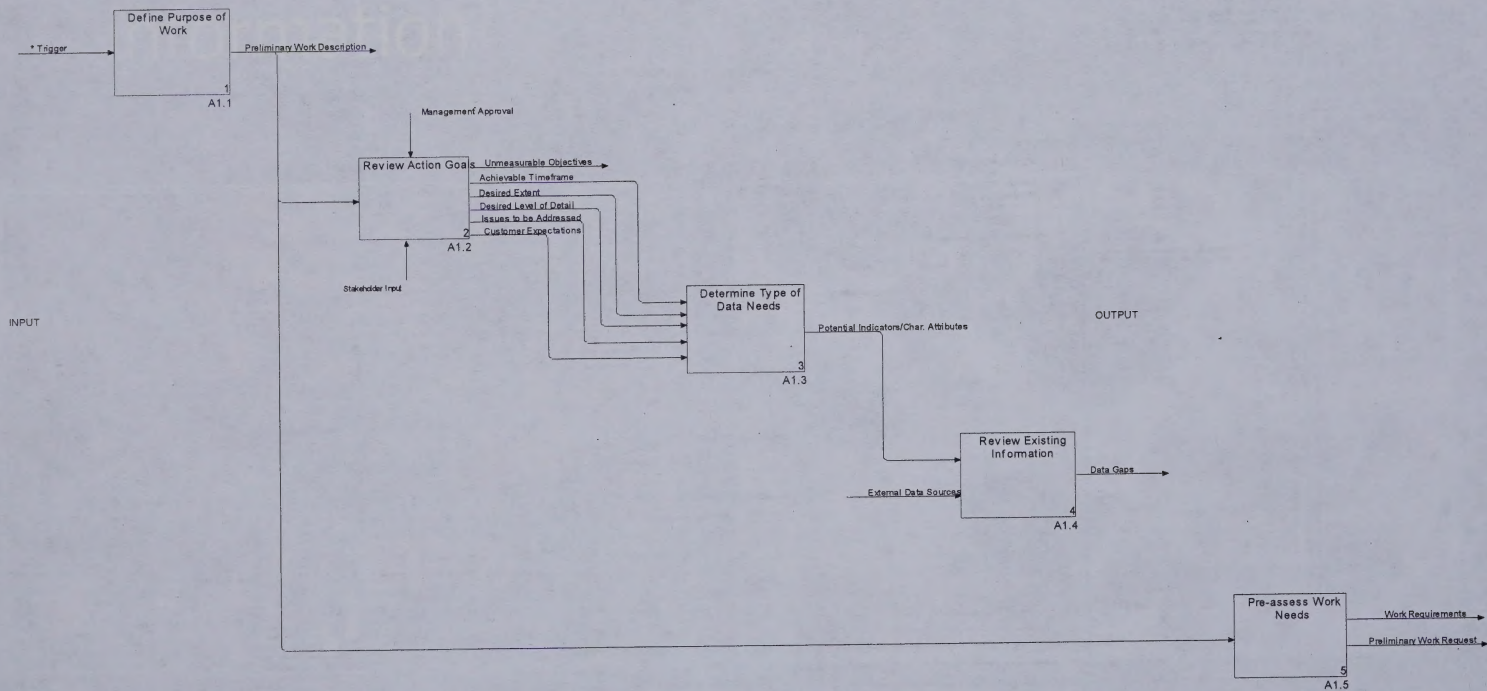
FLPMA

Statutes

Policy Regulations

Guidance

Budget



MECHANISM

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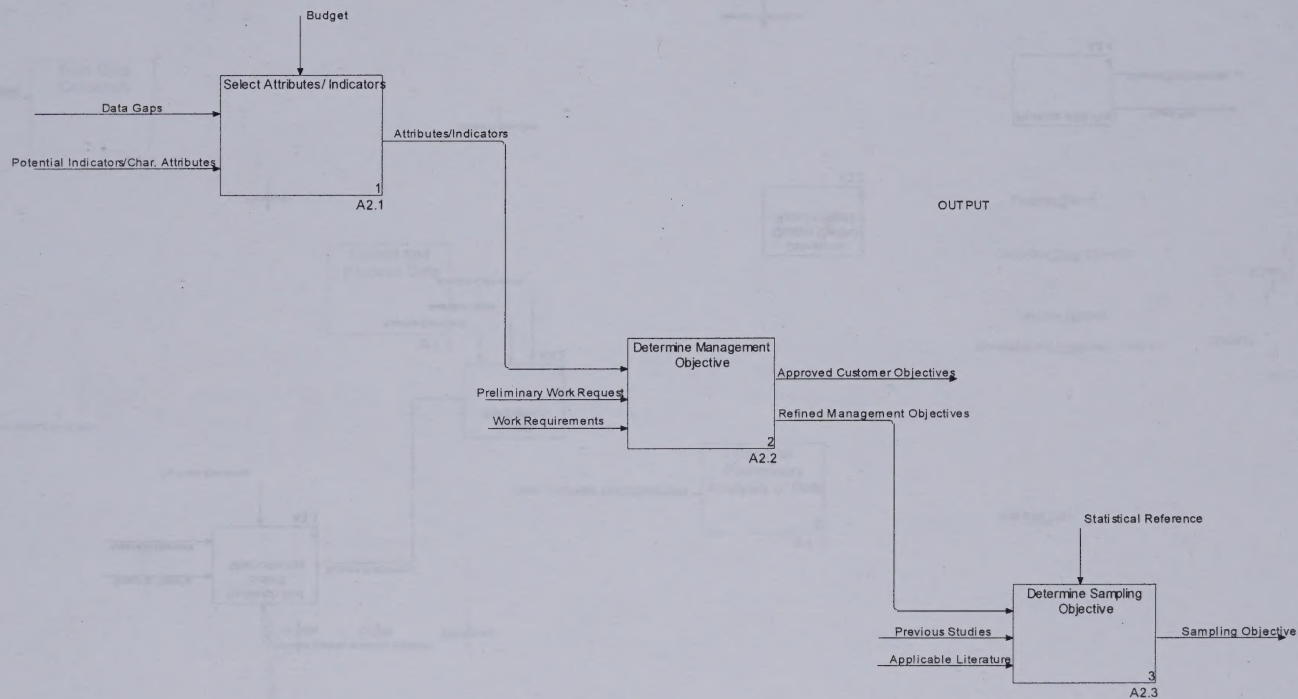
A2 Develop/Refine Objectives

CONTROL

INPUT

OUTPUT

MECHANISM



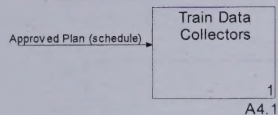


A4 Implement AIM Study

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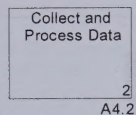
CONTROL

FOIA Data Quality Act Management Change Budget Change Personnel Change



A4.1

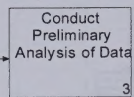
INPUT



A4.2

Changing Environmental Conditions

Other Applicable AIM Project Data →



A4.3

Internet People Equipment

MECHANISM

Progress Report

Completed Data Collection

OUTPUT

Lessons Learned

Unsatisfactory Preliminary Analysis

AIM Raw Data

A5 Develop Findings and Recommendations

CONTROL

Assess
Results/Make
Judgements

1
A5.1

Evaluate Results/
Determine Causal
Factors

2
A5.2

Make
Recommendations
(Decisions) to
Management

3
A5.3

Not Meeting Objectives →
Terms and Conditions →
Lessons Learned →

Conduct Formal
Review

4
A5.4

Complete Final
Report

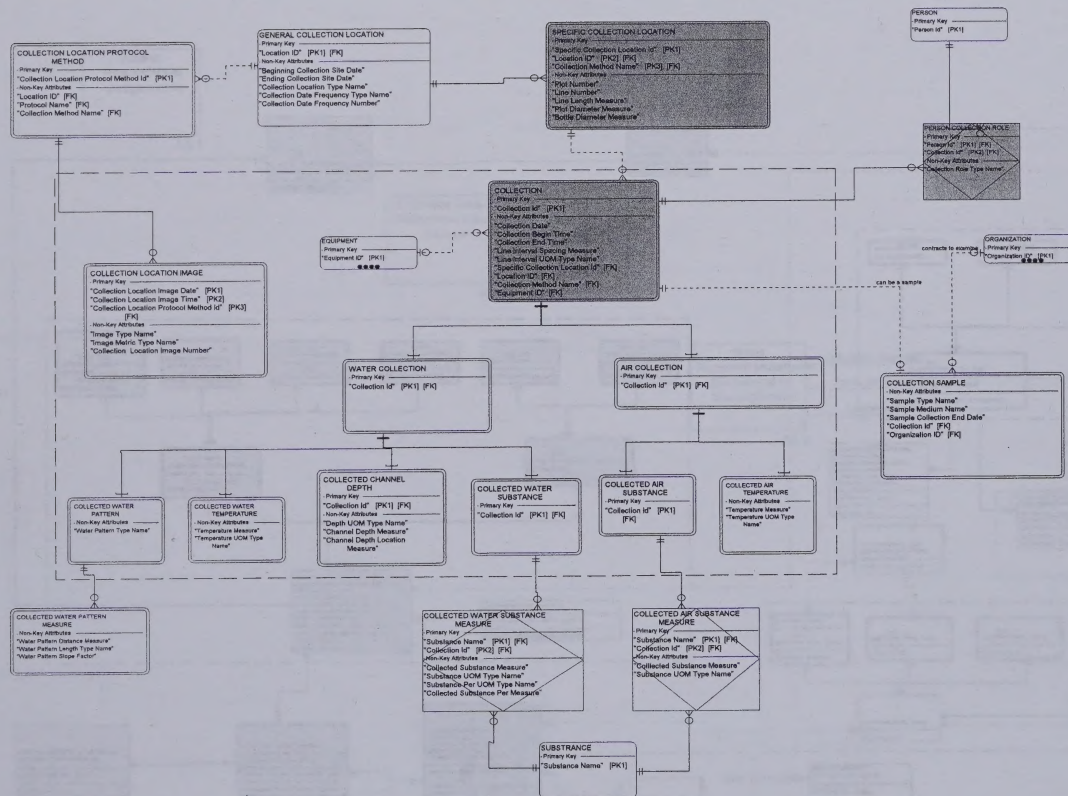
5
A5.5

OUTPUT

Final Report →
Completed AIM Project →

MECHANISM

AIM Air Water Observation [Entity Relation]



ESandR LDM		assgnd	Who Re-	
Attribute	Definition		New Definition	Defined
ACCEPTED SEED LOT DELIVERY		Sara/S cott		
	Information on a seed lot that was accepted for delivery and purchase.	Sara/S cott		
"Adjusted Delivered Seed Unit Cost Amount"	The amount it will cost for a unit measure of seed that was delivered adjusted for factors such as the PLS.	Sara/S cott		
"Cost UOM Type Name"	The unit of measure that is used with the Cost amount to calculate the total cost.	Sara/S cott		
"Delivered Date"	The date on which an order such as seed was delivered to a location.	Sara/S cott		
"Delivered Seed Lot Id"	The unique system generated number that identifies a single occurrence of the entity	Sara/S cott		
"Location ID"	The unique system generated number that identifies a single occurrence of the entity	Sara/S cott		
"Purchase Acceptance Date"	The date on which the seed lot has been accepted to be paid for after testing is completed.	Sara/S cott		
ACTUAL SEED MIX		Sara/S cott		
	The actual combination of various seed species that was used to re-vegetate an area.	Sara/S cott		
"Seed Mix Id"	The unique system generated number that identifies a single occurrence of the entity	Sara/S cott		
ADMINISTRATIVE AUTHORITY		Jack		
	A description of the person and the authority level they have for approving funds.	Jack		
"Authority End Date"	The date on which the administrative authority level ends for a person.	Jack		
"Authority Start Date"	The date on which the administrative authority level starts for a person.	Jack		
"Legal Authority Level Name"	The ranking or funding level of authority that a person has to approve a plan.	Jack		
"Person ID"	The unique (system generated) identifier of the person.	Jack		

Attribute	Definition		New Definition	Defined
ANNUAL PAY GRADE SUMMARY		Jack		
	The summarized information related to each pay grade for a given year.	Jack		
"Average Yearly Pay Grade Amount"	The average salary for a paygrade for a given year.	Jack		
"Pay Grade Code"	A code which designates a pay grade for a federal employee.	Jack		
"Pay Grade Summary Year"	The year that is associated with the Average Yearly Pay Grade Amount.	Jack		
APPROVED LOCAL PLAN		Jack		
	A plan that requires approval at the local level.	Jack		
"Approved Date"	The date on which a person has approved the plan for treating an incident area	Jack		
"Authority Level Name"	The label for the authority level a person has when authorizing a plan for a given incident.	Jack		
"Incident Number"	A randomly assigned alphanumeric code that is assigned to an incident to uniquely identify it.	Jack		
"Person ID"	The unique (system generated) identifier of the person.	Jack		
"Position Type Name"	A label that designates the type of position for a person who works for the government or contractor. examples: Team leader, operations, hydrologist, GIS specialist	Jack		
"Subactivity Plan Type Code"	A code that designates if this is a Rehabilitation or Stabilization funding / budget item. Valid values: R or S	Jack		
ASSESSMENT		Jack		

Data Sources and Data Organization that May Be of Interest to BPR Teams

Product	Purpose	Owner	Office
AIR DATA	Air quality database used to regulate emissions.	EPA	CO/UT
AQUARIUS	Water quality attributes.		
ARS/Jornada	Data forms for principle rangeland monitoring methods. Could be the basis for database design of a BLM data warehouse.	ARS	Jornada
EMAP	Environmental Monitoring and Assessment Program is a research program to track status and trends of national ecological resources. It links data at different scales.	EPA	
Emergency Stabilization and Rehabilitation (ES&R)	Contains a monitoring module for characteristics of ES&R treatments	BLM	WO
FEAT/FIREMON	Stores monitoring data related to fire projects. May be used to house data on WFLC monitoring projects.	DOI	
FORVIS	Forestry attributes	BLM	NSTC
Geocommunicator	Spatial display of various surface characteristics. Especially as it is able to display allotment boundaries and areas meeting or not meeting land health standards.	BLM	NIRMC
LANDFIRE	LANDSAT-based system used to plan fuels treatments. Includes a very detailed, site-based record of land conditions from BLM offices going back to the 1980s.	DOI/US DA	Firelab, EROS
National Climatic Data Center			

Data Sources and Data Organization that May Be of Interest to BPR Teams

Product	Purpose	Owner	Office
National Hydrography Dataset	Capture tabular and spatial information about the condition of stream reaches, particularly related to State water quality standards. Being used now by many BLM offices.	EPA	
National Map	Provide local scale geographic information at a national level.	USGS	GIO
National Water Information System (NWIF)			
NBII	National Biological Information Infrastructure is a data management system that provides increased access to data on the nation's biological resources. Links diverse, high quality biological databases.	USGS	
NILS	Official BLM record system for maintaining land records for the BLM, made up of several components (e.g., LR 2000)	BLM	L&RPO
NPS?	Completing a database for Inventory and Monitoring program.	NPS	
NRCS Soil Surveys	Web-based soil survey information	USDA NRCS	
NRIS	Comprehensive repository of condition-related monitoring data	USFS	
OHV Monitoring	System developed in Utah to assess changes in condition due to OHV use of areas that contain wilderness character	BLM	UT
ORSO data sets	Used to monitor attributes related to the Northwest Forest Plan, Owyhee Uplands project.	BLM	ORSO
Palm Pilot	Modules on land health, PFC have been used by WY and NV staff	BLM	WYSO

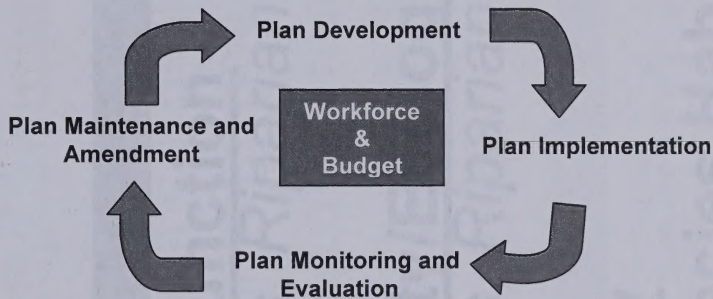
Data Sources and Data Organization that May Be of Interest to BPR Teams

Product	Purpose	Owner	Office
PFC	Database under construction. Will be used to track proper functioning condition of riparian areas.	BLM	NRST
RAS and RIPS	Range administration and range improvement information. Could house information about areas meeting/not meeting standards.	BLM	NSTC
303 d/TMDL	Used to track water quality associated with 303 d-listed streams.	Owned by States.	
TSIS	Timber sale information, includes a monitoring module.	BLM	NSTC
USGS Various Spatial Systems	National Land Cover Dataset, GAP, Re-Gap, Geographic Analysis & Monitoring (GAM)	USGS	
Vegetation Monitoring Analysis Program (VMAP)	The focus of this product is on AIM data. It captures information on vegetation, soils, precipitation, and other characteristics.	BLM	NMSO
WEEDS	Contains a monitoring module??	BLM	MTSO/WO
WISKI	Water quality attributes.	BLM	WYSO

Bureau of Land Management Land Use Planning Process

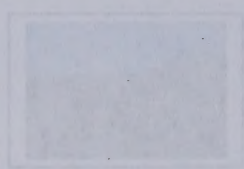


DOI Strategic Plan
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BLM Operating Plan
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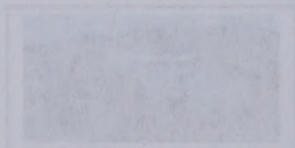
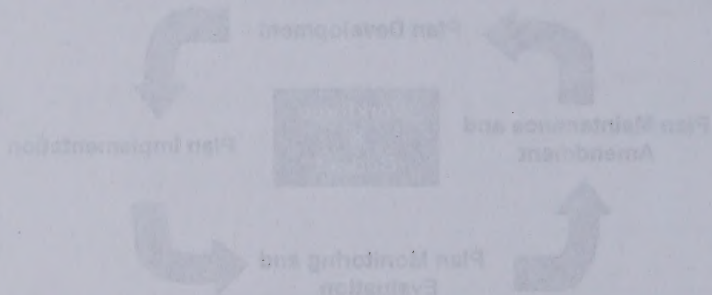
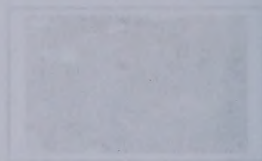


Planning and Science Policy (WO210)
Renewable Resources and Planning (WO200)

Bureau of Land Management Land Use Planning Process



DOI Strategic Plan
↓
BLM Operating Plan



Planning and Science Policy (W0210)
Renewable Resources and Planning (W0200)

BLM Land Health Fundamentals (4)

- Watershed Function
(Upland Acres, Riparian Miles, Lentic Acres)
- Biotic Integrity/Ecological Processes
(Upland Acres, Riparian Miles, Lentic Acres)
- Water Quality
- Sensitive Species Habitat Quality

BLM Land Health Standards

- 3 to 8 per BLM State, 77 total in BLM.
- Developed with the RACs.
- Standards tier from Fundamentals.
- Example: *“Maintain healthy, productive plant and animal communities of native and other desirable species at viable population levels commensurate with the species and habitat’s potential.”*

Representative Land Health Indicators (17)

- Rills.
- Water Flow Patterns.
- Pedestals and/or Terracettes.
- Bare Ground.
- Gullies.
- Wind Scoured, Blowout, and/or Depositional Areas.
- Litter Movement.
- Resistance to Erosion.
- Surface Loss or Degradation.
- Plant composition and distribution.
- Compaction Layer
- Functional/Structural Groups.
- Plant Mortality/Decadence.
- Litter Amount.
- Annual Production.
- Invasive Plants.
- Reproductive Capability of Perennial Plants.

Why Use Land Health Standards as a Building Block of a Bureau-Wide Strategy?

- BLM is committed to evaluating public lands using land health standards that tier from the 4 Fundamentals:
 - Assessments are required by BLM Policy in Manual Section 4180.
 - Land Health Standards must be expressed as goals in BLM's land use plans (1601 LUP Handbook). Associated indicators may be used as a source of LUP objectives.

Why Use Land Health Standards as a Building Block of a Bureau-Wide Strategy?

- These measures offer a unique opportunity to “roll up” condition information.
- Properly used, assessments of standards offer an opportunity to establish causal factors of condition that are broader than livestock grazing.

Why Use Land Health Standards as a Building Block of a Bureau-Wide Strategy?

Dr. Robert M. Anderson

- Land health standards are a critical component of the Bureau's strategy to improve the health of the Nation's lands.
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Regional-Level Assessments and Monitoring Methodologies

- Sagebrush Connectivity (uses NLCD)
- Sagebrush Habitat Assessment Framework
- Owyhee Uplands Modeling
- Box Elder, UT Modeling
- Landscape-scale monitoring protocols in 3 energy-development areas
- Vegetation changes over time in CO River Basin (Salinity Forum)
- Sagebrush mapping across Wyoming (EROS and Ft. Collins)
- Wyoming Basins Eco-Regional Assessment
- Great Basin Integrated Landscape Monitoring

Habitat Connectivity Model Legend



HIGH VIABILITY

- ***Highest value core areas with few or no barriers***
- ***Linkage function intact***



MODERATE VIABILITY

- ***Lower value core areas***
- ***Linkage function largely intact***



LOW VIABILITY

- ***Likely is a barrier between core areas***
- ***Linkage function likely not present***



NEGLIGIBLE OR NO VIABILITY

- ***Is a barrier between core areas***
- ***Linkage function not present***



Prairie Grasslands
Amphibian Project

text_model_color_legend.mxd

by: B. Dürtsche, ebenson

Monitoring Change in the Green River Basin Area

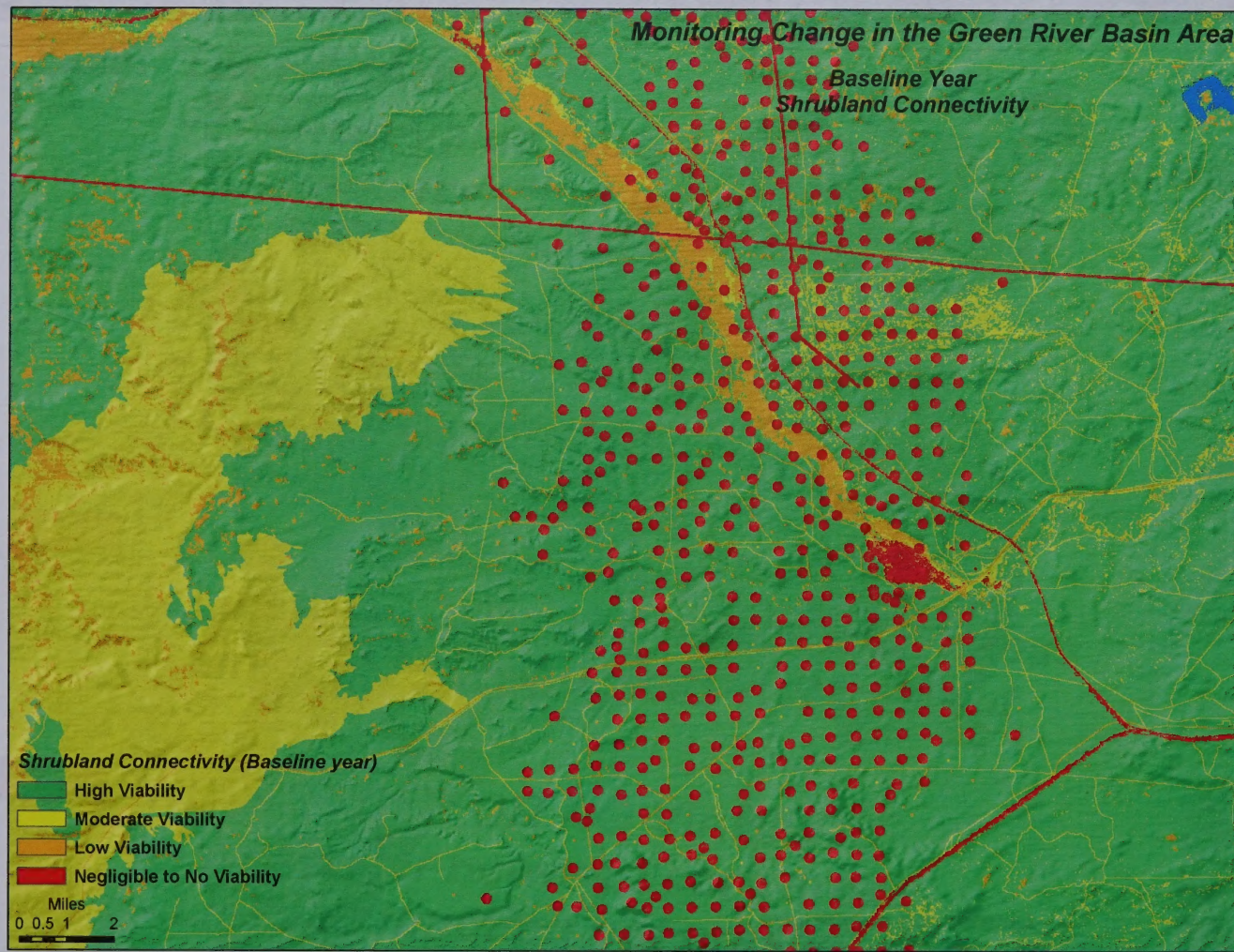
Baseline Year
Shrubland Connectivity

H761

Miles
0 5 10 20

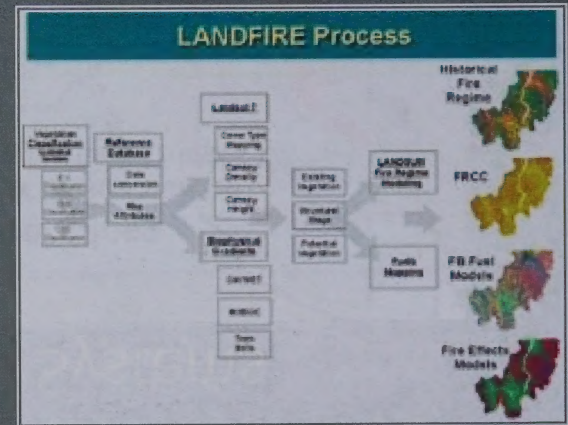
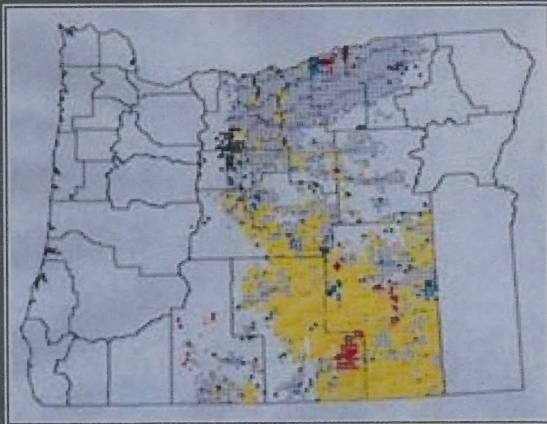
Shrubland Connectivity (Baseline year)

- High Viability
- Moderate Viability
- Low Viability
- Negligible to No Viability

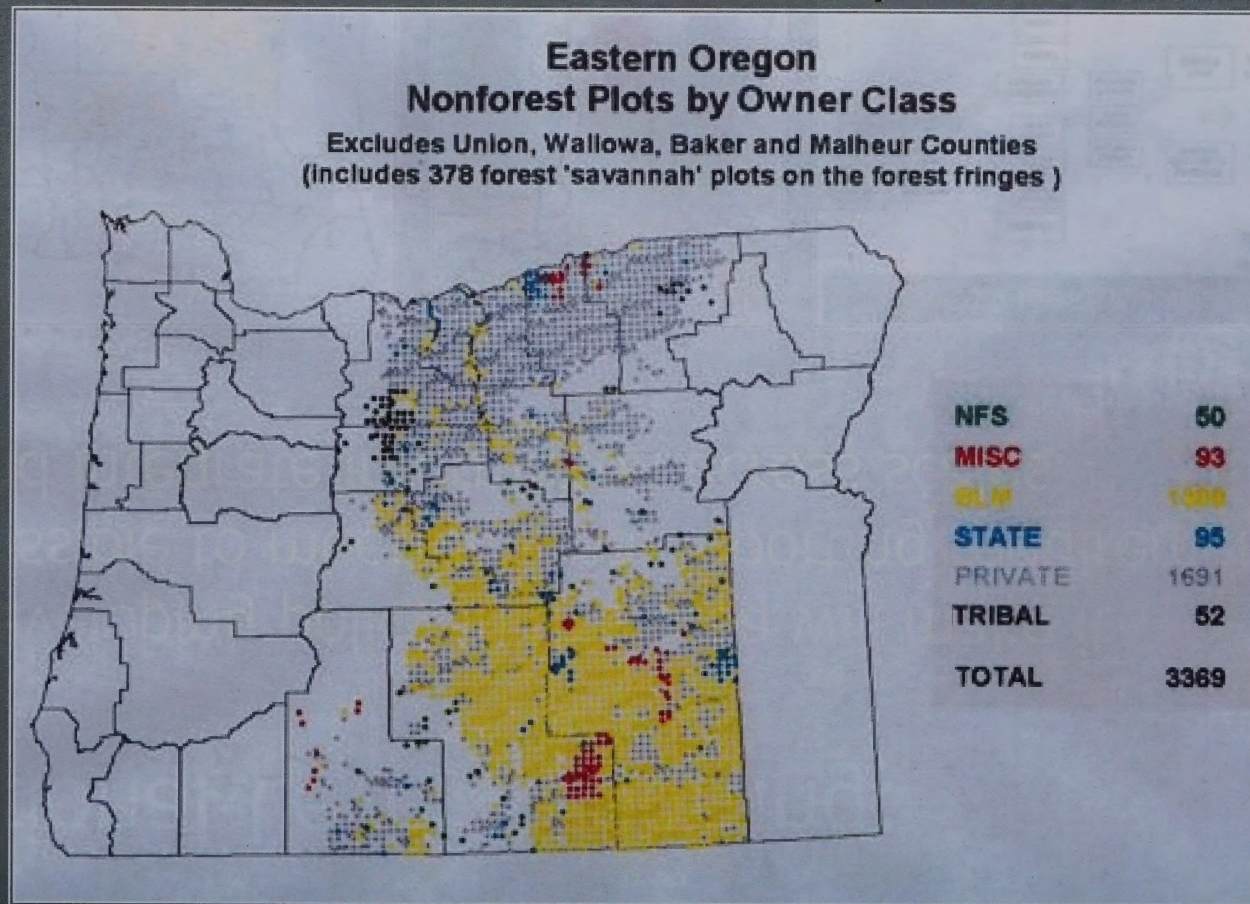


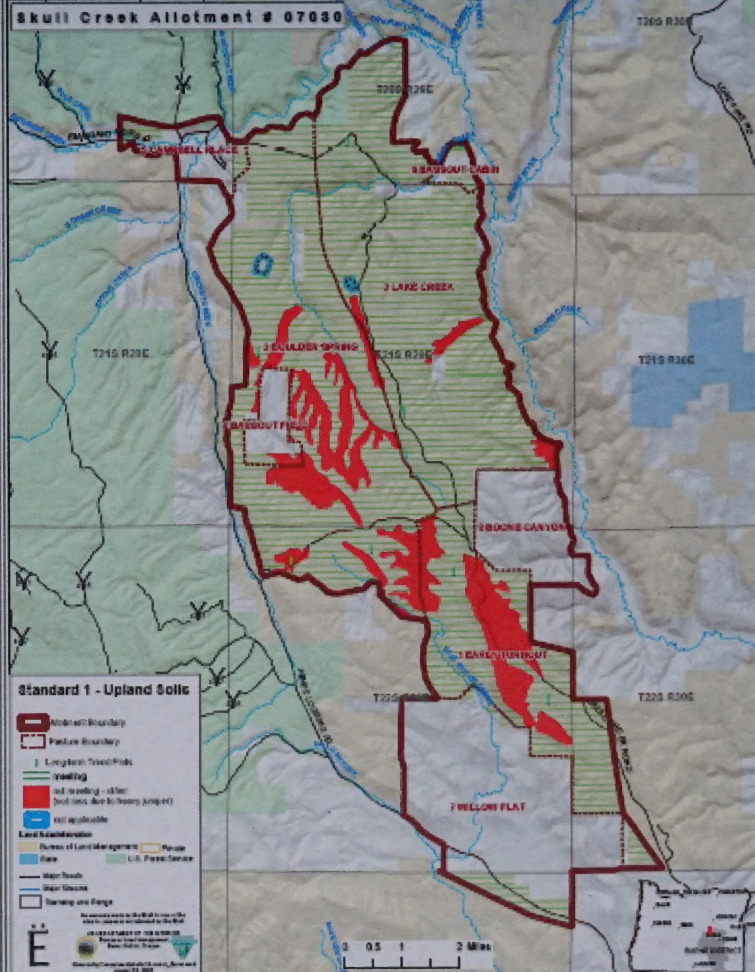
National-Level Reporting:

- Developing policy in this area will make it possible to meet national reporting requirements and integrate information across scales.

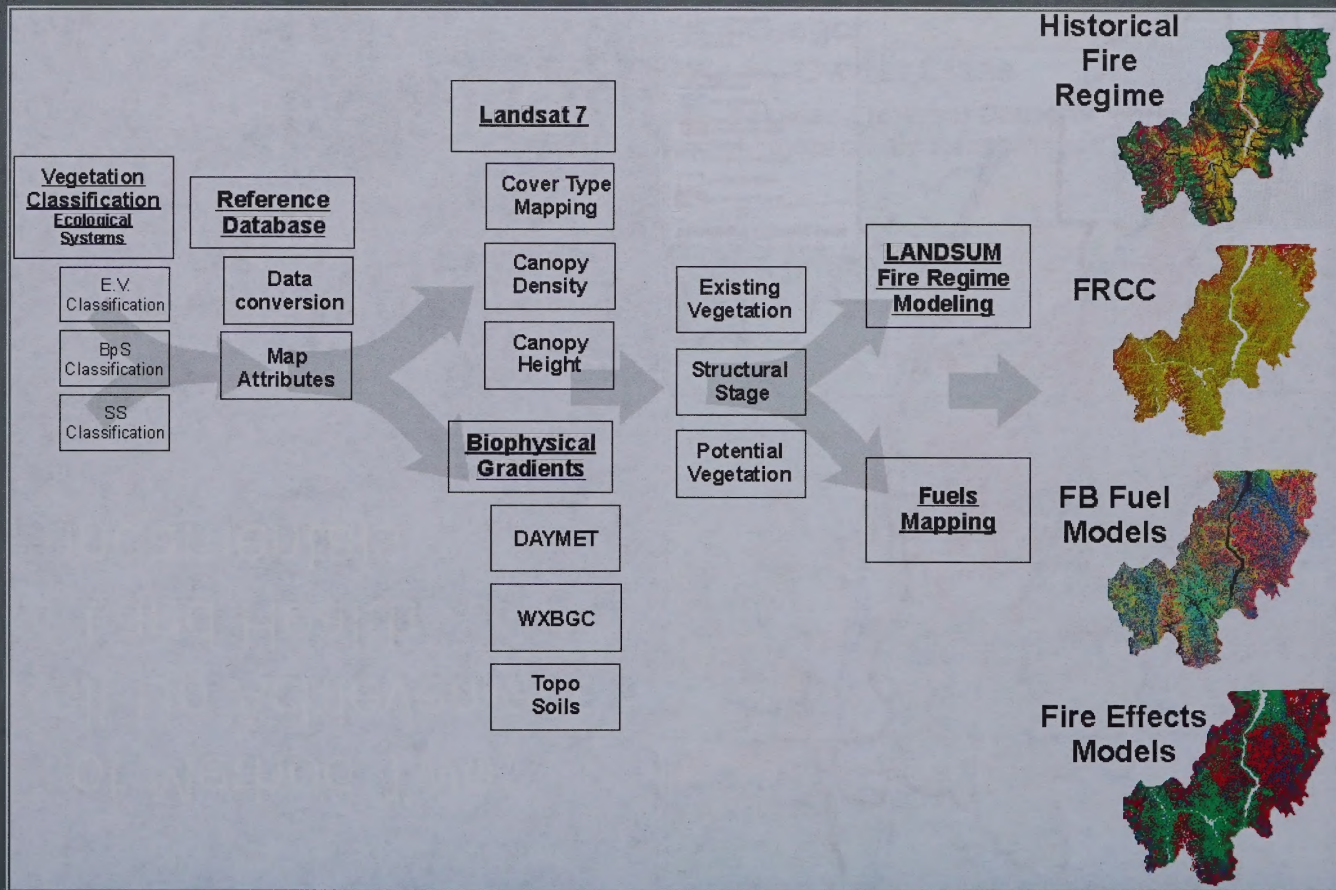


- Pilot Method One:
Oregon Pilot Uses FIA and NRI Systems





Pilot Method Three: Use LANDFIRE to Describe National Condition



Next Steps/Questions?





	DATA GATHERING AND INITIAL ANALYSIS		DATA INTERPRETATION	
	INVENTORY	MONITORING	ASSESSMENT	EVALUATION
Purpose	Inventory is the systematic acquisition of resource information needed for planning and management purposes. It is an initial collection of baseline data, but it may be repeated over time to establish a new baseline.	Monitoring is the collection of information periodically to evaluate progress in meeting management objectives.	Assessments provide judgment/criteria on the condition of resources the agency manages and inform an evaluation which can be used to make or support a management decision. Assessment does not factor in cause, it is a judgment on a resource.	Evaluations determine if program management objectives are being met, and help determine the cause of a condition. This results in recommendations being made to adjust management actions (implementing adaptive management).
Temporal Nature, Types of Data	Inventories are conducted at a point in time utilizing qualitative or quantitative measurements.	Monitoring captures qualitative and/or quantitative measurements over a period of time utilizing methods exact enough to detect resource change.	Assessments are conducted at a point in time using qualitative or quantitative measurements from new or available information.	
Relationship to other A,I, or M	Inventory is interpreted for use in assessments and monitoring.	Inventory can provide baseline for monitoring. Monitoring data may be used in assessments and/or evaluations.	Assessments may make use of new or available inventory and monitoring information.	
Examples	PFC/"Pellant," ESI (Ecological Site Inventory)	Validation, effectiveness. Compliance monitoring is not being considered under the business process re-engineering.	RHA, AML (Abandon Mine Lands), Watershed assessment, Land Health Standards (LHS), Riparian rating.	

NOTES	TRANSCRIPTION	EXPLANATION	TO THE	
1. The first part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	2. The second part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	3. The third part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	4. The fourth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	5. The fifth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.
6. The sixth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	7. The seventh part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	8. The eighth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	9. The ninth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	10. The tenth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.
11. The eleventh part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	12. The twelfth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	13. The thirteenth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	14. The fourteenth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	15. The fifteenth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.
16. The sixteenth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	17. The seventeenth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	18. The eighteenth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	19. The nineteenth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.	20. The twentieth part of the manuscript is a list of names of persons who were present at the meeting. The names are written in the margin of the text.

GLOSSARY

Abundance: The total number of individuals of a species in an area, population, or community (SRM 1999).

Accelerated erosion: Erosion in excess of natural rates, usually as a result of anthropogenic activities (SSSA 1997).

Adaptive Management: a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. Its most effective form-"active" adaptive management-employs management programs that are designed to experimentally compare selected policies or practices, by implementing management actions explicitly designed to generate information useful for evaluating alternative hypotheses about the system being managed. (NPS I&M website Glossary)

Age classes: The distribution of different ages of the same species or group of species on a site (IIRH, Version 4).

Age Class: A descriptive term to indicate the relative age of plants (Habich, 2001).

Air-dry weight: The weight of vegetation after it has been allowed to dry to equilibrium with the atmosphere (Habich, 2001).

Air Quality: the quality of the atmosphere as determined by the concentration of air pollutants, visibility, odors, sound, and other energy forms transmitted through the atmosphere.

Air Quality Related Attributes: those attributes of a PSD Class II area (designated by Congress such as wilderness or wild and scenic rivers) important to the purpose for which the area was established, which may be affected by air pollution. Air quality related attributes include, but are not limited to, visibility, flora, fauna, ecologic, geologic, historic, and cultural characteristics.

Air Quality Related Values (AQRVs): those values of a PSD Class I area important to the purpose for which the area was established, which may be affected by air pollution. Air Quality Related Values include, but are not limited to, visibility, flora, fauna, ecologic, geologic, historic, and cultural characteristics.

Air resource: the air or atmospheric component of the ecosystem. As a management activity, the air resource includes the consideration of climate, weather, air quality, and air quality related attributes and values.

Allotment: an area of land designated and managed for grazing by livestock. Such an area may include intermingled private, State, or Federal lands used for grazing in conjunction with the public lands (Habich, 2001).

Annual plant: A plant that completes its life cycle and dies in 1 year or less (SRM 1999).

Annual production: The net quantity of aboveground vascular plant material produced within a year. *Synonym:* net aboveground primary production (IIRH, Version 4).

OR... The conversion of solar energy to chemical energy through the process of photosynthesis. It is represented by the total quantity of organic material produced within a given period of time (Habich, 2001).

Assessment: The process of estimating or judging the value or functional status of ecological processes (e.g., rangeland health) in a location at a moment in time (IIRH, Version 4).

OR... The process of estimating or judging the functional status of ecosystem structures, functions, or processes within a specified geographic area at a specific time (USDI 2001...H-4180-1-Rangeland Health Standards).

At risk: Rangelands that have a reversible loss in productive capability and increased vulnerability to irreversible degradation based upon an evaluation of current conditions of the soil and ecological processes (NRC 1994). At risk designation may point out the need for additional information needed to better quantify the functional status of an attribute (IIRH, Version 4).

Attribute: One of the three components, soil/site stability, hydrologic function, and biotic integrity that collectively define rangeland health (IIRH, Version 4).

OR... one of the three components—soil and site stability, hydrologic function, and integrity of the biotic community—that collectively define rangeland health (Herrick et al. 2005, Interagency Tech Ref 1734-6 2000).

OR... a distinctive feature of an object (EPA Terminology Reference System... from onelook.com)

OR... an inherent characteristic (Merriam-Webster Online)

OR... any living or nonliving feature or process of the environment that can be measured or estimated and that provide insights into the state of the ecosystem. The term **Indicator** is reserved for a subset of attributes that is particularly information-rich in the sense that their values are somehow indicative of the quality, health, or integrity of the larger ecological system to which they belong (Noon 2003). See Indicator. (NPS, I&M website Glossary)

Autogenic: Self-restoring (SER, 2002).

Badland: A land type consisting of steep or very steep barren land, usually broken by an intricate maze of narrow ravines, sharp crests, and pinnacles resulting from serious erosion of soft geologic materials (SRM 1999).

Bare ground: All land surface not covered by vegetation, rock, or litter (Habich, 2001).

OR... All land surface not covered by vegetation, rock, or litter (SRM 1999). As used in this document, visible biological crusts and standing dead vegetation are included in cover estimates or measurements and therefore are **not** bare ground (e.g., mineral soil) (IIRH, Version 4).

Basal area (plants): The cross-sectional area of the stem or stems of a plant or of all plants in a stand. Herbaceous and small woody plants are measured at or near the ground level; larger woody plants are measured at breast or other designated height. *Synonym:* basal cover (SRM 1999).

Basal cover (area): the cross-sectional area of the stem or stems of a plant or all plants in a stand. Herbaceous and small woody plants are measured at or near ground level; larger woody plants are measured at breast or other designated height (Habich, 2001).

Basal cover (plants): The percent of soil surface covered by plant bases. *Synonym:* basal area (SRM 1999).

Biodiversity: refers to biota in terms of taxonomic and genetic diversity, the variety of life forms present and the community structure thereby created, and the ecological roles performed (SER, 2002).

Biological crust: Microorganisms (e.g., lichens, algae, cyanobacteria, microfungi) and non-vascular plants (e.g., mosses, lichens) that grow on or just below the soil surface. *Synonym:* microbiotic crust and cryptogamic crust (IIRH, Version 4).

Biomass: The total amount of living plants and animals above and below ground in an area at a given time (Habich, 2001).

Biomass (plants): The total amount of living plants above and below ground in an area at a given time (SRM 1999). As used in this document, biomass refers only to parts of standing living plants above ground, and not the roots (IIRH, Version 4).

Biotic integrity: Capacity of a site to support characteristic functional and structural communities in the context of normal variability, to resist loss of this function and structure due to a disturbance, and to recover following such disturbance. (One of the three attributes of rangeland health.) (IIRH, Version 4).

Blowout: An excavation in areas of loose soil, usually sand, produced by wind; a breakthrough or rupture of a soil surface attributable to hydraulic pressure, usually associated with sand boils (SRM 1999).

Brush: A term encompassing various species of shrubs or small trees usually considered undesirable for livestock or timber management. The same species may have value for browse, wildlife habitat, or watershed protection (Habich, 2001).

Bunch grass: A grass having the characteristic growth habit of forming a bunch; lacking stolens or rhizomes (Habich, 2001).

Canopy Cover: the proportion of the soil surface covered by a vertical projection of a plant canopy; the area that is protected from raindrops and is in the shade when the sun is directly overhead (Herrick et al. 2005). (Ask WO230 about reference)

*OR...*the percentage of ground covered by a vertical projection of the outermost perimeter of the natural spread of foliage of plants. Small openings within the canopy are included. Canopy cover may exceed 100 percent and is synonymous with crown cover (Habich, 2001).

Cartographic Scale: The relationship between a map and real world objects (e.g., 1:100,000).

Chemical soil crust: A soil-surface layer, ranging in thickness from a few millimeters to a few centimeters, that is formed when chemical compounds become concentrated on the soil surface. They can reduce infiltration and increase overland water flow similar to physical crusts. They are usually identified by a white color on the soil surface (IIRH, Version 4).

Class I Area: an area designated under the Prevention of Significant Deterioration program with the most stringent degree of protection from future degradation of air quality. The Clean Air Act designates as mandatory Class I areas each national park over 6,000 acres and each wilderness area over 5,000 acres as of August 7, 1977.

Class II Area: an area designated under the Prevention of Significant Deterioration program with a moderate degree of protection from future degradation of air quality.

Climate: composite or generalized weather conditions of a specific region, such as temperature, pressure, humidity, precipitation, sunshine, cloudiness, and winds, averaged over a series of years.

Climax plant community (climax): The final or stable biotic community in a successional series; it is self-perpetuating and in equilibrium with the physical habitat (SRM 1999).

Community pathway: Shifts in plant species compositions among biological communities within a single state (IIRH, Version 4).

Community structure: the physiognomy or architecture of the community with respect to the density, horizontal stratification, and frequency distribution of species-populations, and the sizes and life forms of the organisms that comprise those communities (SER, 2002).

Compaction layer: A near surface layer of dense soil caused by the repeated impact on or disturbance of the soil surface. When soil is compacted, soil grains are rearranged to decrease the void space and bring them into closer contact with one another, thereby increasing the bulk density (SSSA 1997).

Compliance Monitoring -

Composition: The proportions of various plant species in relation to the total on a given area; it may be expressed in terms of cover, density, weight, etc. *Synonym:* Species composition (SRM 1999).

Conceptual Models: purposeful representations of reality that provide a mental picture of how something works to communicate that explanation to others. (NPS I&M website glossary)

Cool season plants: Plants whose major growth occurs during the late fall, winter, and spring. Cool season species generally exhibit C3 photosynthetic pathways (Habich, 2001).

Cover: the proportion of the soil surface covered by a vertical projection of the cover class of interest (e.g. canopy cover, basal cover, litter cover), regardless of what is above or below the object (Herrick et al. 2005). (Ask WO230 about reference)

*OR...*an indication of the relative amount of shelter or protection of all vegetation at a given point, normally used to assess nesting habitat (Connelly, Reese, and Schroeder 2003). (Ask WO230 about reference)

OR... Percentage of material, other than bare ground, covering the land surface. It may include live and standing dead vegetation, litter, biological crust, cobble, gravel, stones, and bedrock. Ground cover plus bare ground would total 100 percent. *Synonym:* ground cover. (IIRH, Version 4).

Criteria Pollutants: air pollutants for which national ambient air quality standards have been set. These include carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone and sulfur oxides.

Cultural landscape (or ecosystem): one that has developed under the joint influence of natural processes and human-imposed organization (SER, 2002).

Damage: acute and obvious changes in an ecosystem (SER, 2002).

Decomposition: The biochemical breakdown of organic matter into its original compounds and nutrients (IIRH, Version 4).

Degradation: subtle or gradual changes that reduce ecological integrity and health (SER, 2002).

Deposition area: An area offsite from where the original soil erosion occurred that now has the soil deposits from the original soil erosion area (IIRH, Version 4).

Descriptor: The narrative that describes the indicator characteristics under each of the five rating categories (Extreme to Total, Moderate to Extreme, Moderate, Slight to Moderate, and None to Slight) in the Rangeland Health Indicator Evaluation Matrix. The "default descriptor" is printed in the Matrix, while the "revised descriptor" is completed by the evaluators if the default descriptor does not fit the characteristics of a particular indicator for a particular ecological site (IIRH, Version 4).

Desired plant community: Of the several plant communities that may occupy a site, it is the one that has been identified through a management plan to best meet the plan's objectives for the site. It must protect the site at a minimum (Habich, 2001).

Destroyed: when degradation or damage removes all macroscopic life and commonly ruins the physical environment of an ecosystem (SER 2002).

Dominant species: Plant species or species groups, which by means of their number, coverage, or size, have considerable influence or control upon the conditions or existence of associated species (Habich, 2001).

OR... Plant species or species groups, which by means of their number, coverage, or size, have considerable influence or control upon the conditions of existence of associated species (SRM 1999). Daubenmire (1968) defines dominant species as "those species whose removal would bring about the greatest readjustments in the edaphic, aerial, and biotic character of their ecosystem. They are often the tallest plants" and "where there is little difference in size, dominance is determined primarily by numbers of individuals." For purposes of this document, *Interpreting Indicators of Rangeland Health*, dominant plants are those of the greatest size per unit area as measured by biomass, production, or cover (IIRH, Version 4).

Driver: The major external driving forces that have large-scale influences on natural systems. Drivers can be natural forces or anthropogenic. (NPS I&M website glossary)

Ecological engineering: manipulation of natural materials, living organisms and the physical-chemical environment to achieve specific human goals and solve technical problems (SER, 2002).

Ecological integrity: a concept that expresses the degree to which the physical, chemical, and biological components (including composition, structure, and process) of an ecosystem and their relationships are present, functioning, and capable of self-renewal. Ecological integrity implies the presence of appropriate species, populations and communities and the occurrence of ecological processes at appropriate rates and scales as well as the environmental conditions that support these taxa and processes. (NPS I&M website glossary)

Ecological process: Natural processes that function within a normal range of variation to produce and support specific plant and animal communities. Ecological processes include: water

cycle (the capture storage and redistribution of precipitation); energy flow (conversion of sunlight to plant and animal matter); and nutrient cycle (the cycle of nutrients such as nitrogen and phosphorus through the physical and biotic components of the environment) (Habich, 2001).

OR... the dynamic attributes of ecosystems, including interactions among organisms and interactions between organisms and their environment. Ecological processes are the basis for self-maintenance in an ecosystem (SER, 2002).

Ecological Reference Area (ERA): land in which ecological processes are functioning within a normal range of variability and the plant community has adequate resistance to and resiliency from most disturbances. This area best represents the potential of a site in both physical function and biological health (Herrick et al. 2005). (Ask WO230 about reference)

OR... An area representing a single ecological site in which ecological processes are functioning within a normal range of variability and the plant community has adequate resistance to and resistance from most disturbances. These areas do not need to be pristine, historically unused lands (e.g., climax plant communities or relict areas) (IIRH, Version 4).

Ecological restoration: the practice of restoring ecosystems as performed by practitioners at specific project sites, based upon restoration ecology science (SER, 2002).

Ecological scale: The spatial or temporal dimensions of phenomena, or, e.g., land management projects (treatments, use authorizations).

Ecological site: A kind of land with a specific potential natural community and specific physical site characteristics, differing from other kinds of land in their ability to produce distinctive kinds and amounts of vegetation and to respond to management. Ecological sites are defined and described with information about soil, species composition, and annual production (Habich, 2001).

Ecological site description: A written narrative of the description of soils, climate, vegetation, uses, and potential of a kind of land with specific physical characteristics to produce distinctive kinds and amounts of vegetation (Habich, 2001).

OR... Description of the soils, uses, and potential of a kind of land with specific physical characteristics to produce distinctive kinds and amounts of vegetation (IIRH, Version 4).

Ecological site inventory: A resource inventory that involves the use of soils information to map ecological sites and plant communities and the collection of natural resource and vegetation attributes. The sampling data from each of these soil-vegetation units, referred to as site write-up areas (SWAs), become the baseline data for natural resource management and planning (Habich, 2001).

Ecological trajectory: one that describes the developmental pathway of an ecosystem through time. In restoration, the trajectory begins with the unrestored ecosystem and progresses towards the desired state of recovery that is expressed in the goals of a restoration project and embodied in the reference ecosystem (SER, 2002).

Ecosystem: defined as, "a spatially explicit unit of the Earth that includes all of the organisms, along with all components of the abiotic environment within its boundaries" (Likens 1992). (NPS I&M website glossary)

OR...Organisms together with their abiotic environment forming an interacting system and inhabiting an identifiable space (Habich, 2001).

OR...Consists of the biota (plants, animals, microorganisms) within a given area, the environment that sustains it, and their interactions (SER, 2002).

Ecosystem drivers: major external driving forces such as climate, fire cycles, biological invasions, hydrologic cycles, and natural disturbance events (e.g., earthquakes, droughts, floods) that have large scale influences on natural systems. (NPS I&M website glossary)

Ecosystem health: the state or condition of an ecosystem in which its dynamic attributes are expressed within 'normal' ranges of activity relative to its ecological stage of development. A restored ecosystem expresses health if it functions normally relative to its reference (ecosystem), or to an appropriate set of restored ecosystem attributes (SER, 2002).

Ecosystem integrity: the state or condition of an ecosystem that displays the biodiversity characteristic of the reference (ecosystem), such as species composition and community structure, and is fully capable of sustaining normal ecosystem functioning (SER, 2002).

Ecosystem management: the process of land-use decision making and land-management practice that takes into account the full suite of organisms and processes that characterize and comprise the ecosystem. It is based on the best understanding currently available as to how the ecosystem works. Ecosystem management includes a primary goal to sustain ecosystem structure and function, a recognition that ecosystems are spatially and temporally dynamic, and acceptance of the dictum that ecosystem function depends on ecosystem structure and diversity. The whole-system focus of ecosystem management implies coordinated land-use decisions. (NPS I&M website glossary)

Effectiveness Monitoring: the process of collecting data and information in order to determine whether or not desired outcomes (expressed as goals and objectives in the land use plan) are being met (or progress is being made towards meeting them) as the allowable uses and management actions are being implemented. A monitoring strategy must be developed as part of the land use plan that identifies indicators of change, acceptable thresholds, methodologies, protocols, and timeframes that will be used to evaluate and determine whether or not desired outcomes are being achieved (BLM H-1601-1, 2005).

Ecosystem stability: the ability of an ecosystem to maintain its given trajectory in spite of stress; it denotes dynamic equilibrium rather than stasis. Stability is achieved in part on the basis of an ecosystem's capacity for resistance and resilience (SER, 2002).

Emissions Inventory: a quantitative statement of the types and quantities of air pollutants emitted for specified source categories within a specified place or region over a specified period of time. For any pollutant, emissions usually are expressed in terms of the tons per day, pounds per hour, or grams per second.

Energy flow: Conversion of sunlight to plant and animal matter; one of the ecological processes (IIRH, Version 4).

Erosion: Detachment and movement of soil or rock fragments by water, wind, ice, or gravity (Habich, 2001).

OR... Detachment and movement of soil or rock fragments by water, wind, ice, gravity; the land surface worn away by running water, wind, ice, or other geological agents, including such processes as gravitational creep (SRM, 1999).

Evaluation area: The area (generally $\frac{1}{2}$ to 1 acre in size) where the evaluation of rangeland health attributes takes place (IIRH, Version 4).

Evaluator(s): The person or persons conducting the evaluation of rangeland health on an evaluation area (IIRH, Version 4).

Exclosure: An area fenced to exclude animals (SRM, 1999).

Exotic plant: A plant growing on or occurring in an ecosystem beyond its natural range of existence or natural zone of potential dispersal (IIRH, Version 4).

Fauna: The animal species of a region (Habich, 2001).

Flow pattern: The path that water takes (i.e., accumulates) as it moves across the soil surface during overland flow (IIRH, Version 4).

Foliar Cover: The percentage of ground covered by the vertical projection of the aerial portion of plants. Small openings in the canopy and intraspecific overlap are excluded. Foliar cover is always less than canopy cover; either may exceed 100 percent (USDA, 1997).

Forb: an herbaceous plant other than a grass, sedge, or other plant with similar foliage (Connelly, Reese, and Schroeder 2003). (Ask WO230 about reference)

OR...Any herbaceous plant other than those in the Gramineae (true grasses), Cyperaceae (sedges), and Juncaceae (rushes) families (i.e., any nongrass-like plant) having little or no woody material on it; a broadleaved flowering plant whose above ground stem does not become woody and persistent (Habich, 2001).

OR...a broad-leaved herb other than a grass, especially one growing in a field, prairie, or meadow.

Forestland: Land on which the potential natural community is dominated by trees (Habich, 2003).

Functional/structural groups: A suite or group of species that because of similar shoot or root structure, photosynthetic pathways, nitrogen fixing ability, life cycle, etc., are grouped together on an ecological site basis (IIRH, Version 4).

OR...assemblages of organisms by their functional roles in the ecosystem (e.g., primary producers, herbivores, carnivores, decomposers, nitrogen fixers, pollinators) (SER, 2002).

Functioning: (1) Refers to the rangeland health attributes where the majority (see definition of "preponderance of evidence") of the associated indicators are rated as having little or no deviation from that described in the Reference Sheet (Appendix 2) for the ecological site; (2) Refers to the presence and integrity of ecological processes (energy flow, water cycling, and nutrient cycling) being within the range of expectations for the ecological site (IIRH, Version 4).

Genetic fitness: the gene pool possesses genetic redundancy, whereby the gene pool contains a diversity of alleles that may be selected in response to environmental change (SER, 2002).

Geomorphology: The science that studies the evolution of the earth's surface. The science of landforms (SSSA 1997).

Grass: Any plant of the family Gramineae (Poaceae) (Habich, 2001).

Grasslike plant: A plant of the Cyperaceae (sedges) and Juncaceae (rushes) families, which vegetatively resembles a true grass of the Gramineae family (Habich, 2001).

Ground cover: The percentage of material, other than bare ground, covering the land surface. It may include live and standing dead vegetation, litter, cobble, gravel, stones, and bedrock. Ground cover plus bare ground would total 100 percent (Habich, 2001).

Growing season: That portion of the year when temperatures and moisture permit plant growth. In tropical climates, it is determined by the availability of moisture (Habich, 2001).

Gully: A furrow, channel, or miniature valley, usually with steep sides, through which water commonly flows during and immediately after rains or snow melt (Habich, 2001).

OR... Small channels eroded by concentrated water flow (IIRH, Version 4).

Habitat: an area with the combination of resources (like food, shelter and water) and environmental conditions (like temperature, precipitation) that promotes occupancy by individuals of a given species (or population) and allows those individuals to survive and reproduce. The definition of habitat is specific to the organism or species of interest. It can be more than a single vegetation type or vegetation structure, and is the sum of the specific resources needed by a species (e.g., food, shelter, water).

*OR...*a place where an animal or plant normally lives for a substantial part of its life, often characterized by dominant plant forms and/or physical characteristics (BLM Manual 6600-Fish, Wildlife, and Special Status Plant Resources Inventory and Monitoring 1990)

*OR...*the dwelling place of an organism or community that provides the requisite conditions for its life processes (SER 2002).

Habitat Fragmentation: The mixture of habitat and non-habitat (synonymous with unsuitable habitat). The process of habitat fragmentation is one where a species habitat is being reduced (habitat loss) and fragmented into pieces separated by areas of unsuitable habitat. Habitat fragmentation has not occurred when habitat has been separated by unsuitable habitat but occupancy, reproduction or survival of the species has not been affected (Franklin et al. 2002). (ask WO230 on these 3 references)

*OR...*Habitat fragmentation is the disruption of extensive habitats into isolated and small patches, often resulting in loss of total habitat area and the creation of smaller, more isolated, remaining habitat patches (Meffe and Carroll 1997).

*OR...*The breaking up of large and continuous ecosystems, communities, and habitats into smaller areas that are surrounded by altered or disturbed land or aquatic substrate (EPA Terminology Reference System)

Habitat Generalist: an organism which can survive under a wide variety of conditions, and does not specialize to live under any particular set of circumstances (UCMP Ecology Glossary, onelook.com)

Habitat Indicator: Component or attribute of habitat that can be observed and/or measured that provides evidence of habitat suitability.

Habitat Patch: A species habitat unit, appropriate for the scale of interest, surrounded by unsuitable habitat (adapted from Franklin et al. 2002). (Ask WO230 about reference)

*OR.....*A habitat unit of variable size that contains a homogenous set of characteristics (Connelly, Reese, and Schroeder 2003). (Ask WO230 about reference)

Habitat Suitability: the relative appropriateness of a certain ecological area for meeting the life requirements of an organism.

Suitable Habitat: habitats, described by the availability, condition, and proximity of life requisites on the landscape; that provide conditions necessary for successful survival and reproduction when compared to similar environments (Cooperrider et al. 1986, Morrison et al. 1998). (Ask WO230 about reference)

Marginal Habitat: Habitats that support the species but survival rates and reproduction are generally lower than that for suitable habitats by comparison (Cooperrider et al. 1986). (Ask WO230 about reference)

Unsuitable Habitat: Ecological area is missing one or more of the basic habitat requirements of food, shelter or water and therefore, cannot support sustainable populations. (Note: Connelly et al. (2004) considered urban, agriculture, water, and forested habitats to be unsuitable habitats for greater sage-grouse. Grasslands were included in potential habitat only if located < 5 km from a sage-grouse lek that was active within the past 10 years. Otherwise grasslands were classed as nonhabitat or unsuitable (page 5-15).) (Ask WO230 about reference)

Half-shrub: A perennial plant with a woody base whose annually produced stems die each year (SRM 1999).

Harvest: The removal of annual vegetation production from an area of land (Habich, 2001).

Headcut: Abrupt elevation drops in the channel of a gully that accelerate erosion as it undercuts the gully floor and migrates upstream (IIRH, Version 4).

Healthy rangelands: The degree to which the integrity of the soil, vegetation, water, and air, as well as the ecological processes of the rangeland ecosystem, are balanced and sustained. Integrity is defined as maintenance of the structure and functional attributes characteristic of a locale, including normal variability (SRM 1999). *Synonym:* rangeland health.

Herbaceous: Nonwoody plant growth (Habich, 2001).

Historical climax plant community: The plant community considered to best typify the potential plant community of an ecological site prior to the advent of European man (Habich, 2001).

OR... The plant community that was best adapted to the unique combination of factors associated with the ecological site. It was in a natural dynamic equilibrium with the historic biotic, abiotic, climatic factors on its ecological site in North America at the time of European immigration and settlement (USDA 1997).

Historical Reference Point: an ecological site where data were collected to be used as a basis or standard for evaluation or comparison over time.

Hydrologic function: The capacity of the site to capture, store, and safely release water from rainfall, run-on, and snowmelt (where relevant), to resist a reduction in this capacity, and to recover this capacity following degradation (one of the three attributes of rangeland health). (IIRH, Version 4).

Increaser: For a given plant community, those species that increase in amount as a result of a specific abiotic/biotic influence or management practice (SRM 1999).

Indicator: Components of a system whose characteristics (e.g., presence or absence, quantity, distribution) are used as an index of an attribute (e.g., rangeland health) that are too difficult, inconvenient, or expensive to measure (IIRH, Version 4).

Implementation Monitoring: the process of tracking and documenting the implementation (or progress toward implementation) of land use plan decisions. This should be done at least annually and should be documented in the form of a tracking log or report. The report must be made available for public review. The report should describe management actions proposed or undertaken to implement land use plan decisions and can form the basis for annual budget documents. In subsequent years, reports should document which management actions were completed and what further actions are needed to continue implementing land use plan decisions. (BLM H-1601-1, 2005).

Increaser: Those species that increase in amount for a given plant community, as a result of a specific abiotic/biotic influence or management practice (Habich, 2001).

Increments: the amount of additional pollution, above a specified baseline level, which may be allowed in a particular PSD (Prevention of Significant Deterioration) area. The amount of allowable increment varies with whether the area is Class I, Class II, or Class III.

Indicator: Component of a system whose characteristics (e.g. presence or absence, quantity, distribution) are used as an index of an attribute (Interagency Tech Ref 1734-8 2000).

*OR...*a subset of monitoring attributes that are particularly information-rich in the sense that their values are somehow indicative of the quality, health, or integrity of the larger ecological system to which they belong (Noon 2003). Indicators are a selected subset of the physical, chemical, and biological elements and processes of natural systems that are selected to represent the overall health or condition of the system. (NPS I&M website glossary)

Infiltration: The entry of water into the soil (SSSA 1997).

Influential scientific information: Under the Data Quality Act, scientific information the agency reasonably can determine will have or does have a clear and substantial impact on important public policies or private sector decisions.

Interrill erosion: The removal of a fairly uniform layer of soil on a multitude of relatively small areas by splash due to raindrop impact and by sheet flow (SSSA 1997).

Invader: Plant species that were absent in undisturbed portions of the original vegetation of a specific range site and will invade or increase following disturbance or continued heavy grazing (SRM 1999).

Invasion: The migration of organisms from one area to another area and their establishment in the latter (Habich, 2001).

Invasive plants: Plants that are not part of (if exotic), or are a minor component of (if native), the original plant community or communities that have the potential to become a dominant or co-dominant species on the site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g. short-term response to drought or wildfire) are not invasive plants (IIRH, Version 4).

Inventory: the systematic acquisition and analysis of resource information needed for planning and management purposes (Interagency Tech Reference 1734-6 2000).

*OR...*Gathering of baseline information (including quantitative data, cultural knowledge, and qualitative observations) about condition of resources (BLM H4180-1-Rangeland Health Standards 2001).

*OR...*the periodic and systematic collection and analysis of data on the distribution, condition, trend, and utilization of fish and wildlife resources and special status plant species (BLM Manual 6600-Fish, Wildlife, and Special Status Plant Resources Inventory and Monitoring 1990).

*OR...*An extensive point-in-time survey to determine the presence/absence, location or condition of a biotic or abiotic resource. (NPS I&M website glossary)

Land Use Plan: Land use plans means a resource management plan (RMP) or management framework plan (MFP), developed under the provisions of 43 CFR 1600. These plans are developed through public participation in accordance with the provisions of the Federal Land Policy and Management Act of 1976 and establish management direction for resource uses of public lands (43 CFR 4100).

Landscape: consists of a mosaic of two or more ecosystems that exchange organisms, energy, water, and nutrients (SER, 2002).

Life Form: Characteristic form or appearance of a species at maturity, such as a grass, forb, tree, or shrub (Habich, 2001).

Life Requisites: items an animal needs to survive; these include food, shelter / cover, and water. (Morrison et al. 1998) (Ask WO230 about reference)

Litter: The uppermost layer of organic debris on the soil surface; essentially the freshly fallen or slightly decomposed vegetal material (Habich, 2001).

Maintenance Area: a geographic area in which the concentration of one or more criteria pollutants once exceeded national ambient air quality standards, but is currently subject to a formal plan to prevent future violations.

Major land resource area: Broad geographic areas that are characterized by a particular pattern of soils, climate, water resources, vegetation, and land use. Each MLRA, in which rangeland and forestland occur, is further divided into ecological sites (Habich, 2001).

Management objective: A planned result to be achieved within a stated time period. Objectives are subordinate to goals, are specific with shorter timeframes, and have increased possibility of attainment. Time periods for completion and outputs or achievements are measurable and quantifiable (Habich, 2001).

Marginal Habitats: see definition under habitat suitability.

Measures: specific feature(s) used to quantify an indicator, as specified in a sampling protocol. For example, pH, temperature, dissolved oxygen, and specific conductivity are all measures of water chemistry. (NPS I&M website glossary)

Metadata: Data about data. Metadata describes the content, quality, condition, and other characteristics of data. Its purpose is to help organize and maintain a organization's internal investment in spatial data, provide information about an organization's data holdings to data catalogues, clearinghouses, and brokerages, and provide information to process and interpret data received through a transfer from an external source. (NPS I&M website glossary)

Microsite: A spatial unit that contains only a few biological individuals that has a distinct climate or soil from the surrounding units (e.g., the spaces between plants relative to the spaces under plants). (IIRH, Version 4).

Mitigation: an action that is intended to compensate environmental damage (SER, 2002).

Monitoring: The regular collection of data over time to evaluate: 1) whether objectives or land health standards are being achieved; 2) effectiveness of management actions (BLM H-4180-1-Rangeland Health Standards 2001).

OR... the collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting a management objective (Elzinga, Salzer, and Willoughby 1998).

OR... the orderly collection and analysis of resource data to evaluate progress in meeting resource management objectives. Monitoring may also include 1) the collection of data to evaluate progress in complying with laws, regulations, policies, executive orders, and management decisions, and 2) the collection of data in order to assist in resource protection (BLM Manual 6600-Fish, Wildlife, and Special Status Plant Resources Inventory and Monitoring 1990)

OR... The orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting management objectives. The process must be conducted over time in order to determine whether or not management objectives are being met (SRM 1999).

National Ambient Air Quality Standards (NAAQS): the allowable concentrations of air pollutants in the ambient (public outdoor) air specified in 40 CFR 50. National ambient air quality standards are based on the air quality criteria and divided into primary standards (allowing an adequate margin of safety to protect the public health) and secondary standards (allowing an adequate margin of safety to protect the public welfare). Welfare is defined as including (but not limited to) effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility, climate, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being.

Native invasive: A native plant that has migrated to a site where it was not a part of the original plant community, or a native plant that because of management or other changes is now increasing beyond its original composition on the site (IIRH, Version 4).

Native pasture: Land on which native vegetation (climax or natural potential plant community) is forest, but which is used and managed primarily for production of native plants for forage.

Appendix B: Glossary of Terms for Assessment, Inventory, and Monitoring

Native pasture includes cutover forestland and forested areas that were cleared and used as cropland (Habich, 2001).

Native species: A species that is a part of the original fauna and flora of an area (Habich, 2001).

Natural Background Level: the concentration of a pollutant that would exist in the absence of anthropogenic (human-caused) pollution.

Natural disturbance regime: The frequency and intensity of events that occur because of climate or animals (e.g., flood, fire, frost heave, drought, animal burrowing, or defoliation) that alter the structure of ecological systems or the processes that maintain ecological systems (IIRH, Version 4).

Natural Landscape (or ecosystem): one that developed by natural processes and that is self-organizing and self-maintaining.

Natural Resource Condition:

Niche: ecological role of a species in a community (Glossary Update Task Group 1998. Glossary of terms used in range management, 4th ed. Society for Range Management, Denver, Colorado, USA.)

Nitrogen fixation (fixers): The biological reduction of molecular nitrogen to chemical forms that can be used by organisms in the synthesis of organic molecules. (IIRH, Version 4).

Nonattainment Area: a geographic area within which the concentration of one or more criteria pollutants routinely exceeds national ambient air quality standards. PSD (Prevention of Significant Deterioration) requirements do not apply in non-attainment areas.

Nonvascular plants: Plants without specialized water or fluid conductive tissue (Xylem and phloem) that includes bryophytes, lichens and algae (Habich, 2001).

Normal variability or normal range of variability: The deviation of characteristics of biotic communities and their environment that can be expected given natural variability in climate and disturbance regimes. (IIRH, Version 4).

Noxious weed: An unwanted plant specified by Federal or State laws as being especially undesirable, troublesome, and difficult to control. It grows and spreads in places where it interferes with the growth and production of desired species (Habich, 2001).

OR... Any plant designated by a Federal, State, or county government to be injurious to public health, agriculture, recreation, wildlife, or any public or private property (Sheley et al. 1999).

Nutrient cycle: The cycle of nutrients, such as nitrogen and phosphorus, through the physical and biotic components of the environment; one of the ecological processes (Habich, 2001).

Organic matter: Living plant tissue and decomposed or partially decomposed material from living organisms (IIRH, Version 4).

Oxidation: The loss of one or more electrons by an ion or molecule (SSSA 1997). Oxidation is a chemical process of decomposition whereby nutrients are released into the atmosphere instead of into the soil. Oxidation commonly increases as aridity increases (IIRH, Version 4).

Pasture: A grazing area enclosed and separated from other areas by a fence or natural barrier (Habich, 2001).

Pedestal (erosional): Plants or rocks that appear elevated as a result of soil loss by wind or water erosion (does not include plant or rock elevation as a result of non-erosional processes such as frost heaving). (IIRH, Version 4).

Pedon: The smallest body of one kind of soil large enough to represent the nature and arrangement of horizons and variability in the other properties that are preserved in samples. Pedons extend down through all genetic horizons (Habich, 2001).

Perennial Grassland: Area dominated by perennial native or introduced grasses with generally less than 2% canopy cover of shrubs or trees. (ref? - ask WO230 about reference)

Perennial Plant: A plant that has a life span of 3 or more years (Habich, 2001).

Phenology: The study of periodic biological phenomena that are recurrent (e.g., flowering, seeding), especially as related to climate (Habich, 2001).

Physical crust: Thin surface layers induced by impact of raindrops on bare soil causing the soil surface to seal and absorb less water (IIRH, Version 4).

Plant decadence: In a plant community, decadence refers to an overabundance of dead or dying plants relative to what is expected for a site given the natural range of variability in disease, climate, and management influences (IIRH, Version 4).

Plant mortality: The death of a plant, or in a plant community, the death of a number of plants in the community (IIRH, Version 4)

Potential: (a) Capable of being, but not yet in existence; latent. (b) The ecological community that would be established if all successional sequences of its ecosystem were completed without additional human-caused disturbance under present environmental conditions; often referred to as "potential natural community." (DOA/DOI, Regional Ecosystem Office 1995). (Ask WO230 about reference)

Potential Natural Community (PNC): The biotic community that would become established if all successional sequences were completed without interference by man under the present environmental conditions. Natural disturbances are inherent in development. PNCs can include naturalized nonnative species (Habich, 2001).

Potential natural vegetation: A historical term originally defined by A.W. Kuchler as the stable vegetation community which could occupy a site under current climatic conditions without further influence by people. Often used interchangeably with "potential natural community" (SRM 1999).

Precision: the closeness of repeated measurements of the same quantity (Elzinga, Salzer, and Willoughby 1998).

Preponderance of evidence: The rating of an attribute of rangeland health by observing where the distribution of indicators is in respect to the five categories used to rate each indicator associated with that attribute (IIRH, Version 4).

Prevention of Significant Deterioration (PSD): the air quality management and permit process (specified in Part C of the Clean Air Act), designed to limit the amount of additional

(incremental) air quality degradation in attainment areas, or adverse impacts of Air Quality Related Values, while maintaining a margin for future industrial growth.

Proper Functioning Condition: Lentic riparian areas are functioning properly when adequate vegetation, landform, or debris is present to: dissipate energies associated with wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion and improving water quality; filter sediment and aid floodplain development; improve flood-water retention and ground water recharge; develop root masses that stabilize islands and shoreline features against cutting action; restrict water percolation; develop diverse ponding characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterbird breeding, and other uses; and support greater biodiversity (USDI 1999). (Ask WO230 for reference.)

Protocols: as used by this program, are detailed study plans that explain how data are to be collected, managed, analyzed and reported and are a key component of quality assurance for natural resource monitoring programs (Oakley et al. 2003). (NPS I&M website glossary)

Qualitative: Observational type data that is recorded but not measured (Habich, 2001).

Qualitative rangeland health assessment: The determination of the functional status of attributes through non-numerical observations of indicators. Qualitative assessments have an element of subjectivity (IIRH, Version 4).

Quantitative: Collection of data by measuring vegetation or soil characteristics (Habich, 2001).

OR... Data derived from measurements, such as counts, dimensions, weights, etc., and recorded numerically; may include ratios or other values. Qualitative numerical estimates, such as ocular cover and production estimates, are often referred to as "semi-quantitative." (IIRH, Version 4).

Quantitative rangeland health assessment: The determination of the functional status of an attribute(s) through measurement of vegetation, soil, or landscape characteristics that are indicators or can be used to derive indicators. Quantitative assessments have a known level of precision and accuracy, and require a quantitative reference (IIRH, Version 4).

Range condition: The present status of vegetation of a range site in relation to the climax (natural potential) plant community for that site. It is an expression of the relative degree to which the kinds, proportions, and amounts of plants in a plant community resemble that of the climax plant community for the site (SRM 1999).

Rangeland: A type of land on which the indigenous vegetation (climax or natural potential) is predominantly grasses, grasslike plants, forbs, or shrubs and managed as a natural ecosystem. If plants are introduced, they are managed similarly. Rangeland includes natural grasslands, savannas, shrublands, many deserts, tundras, alpine communities, marshes, riparian zones, and wet meadows (Habich, 2001).

Rangeland health: The degree to which the integrity of the soil, vegetation, water, and air, as well as the ecological process of the rangeland ecosystem, are balanced and sustained (Habich, 2001).

OR... The degree to which the integrity of the soil, vegetation, water, and air, as well as the ecological processes of the rangeland ecosystem, are balanced and sustained. Integrity is

defined as maintenance of the structure and functional attributes characteristic of a locale, including normal variability (SRM 1999).

Rangeland Health Assessment: The process of estimating, measuring, or judging the value or functional status of ecological processes (e.g., rangeland health) in a location at a moment of time (based on IIRH, Version 4).

Rangeland similarity index: The present state of vegetation and soil protection of an ecological site in relation to the potential natural community for the site (Habich, 2001).

Reclamation: main objectives of reclamation activities include the stabilization of the terrain, assurance of public safety, aesthetic improvement, and usually a return of the land to what, within the regional context, is considered to be a useful purpose (SER, 2002).

Recruitment: The successful entry of new individuals into the breeding population (IIRH, Version 4).

Reference ecosystem: an ecosystem that can serve as the model for planning an ecological restoration project, and later serve in the evaluation of that project. In instances where the object of restoration consists of two or more kinds of ecosystems, the reference can be called the reference landscape or, if only a portion of a local landscape is to be restored, the reference landscape unit (SER, 2002).

Reference state: The reference state is the state where the functional capacities represented by soil/site stability, hydrologic function, and biotic integrity are performing at an optimum level under the natural disturbance regime. This state usually includes, but is not limited to, what is often referred to as the potential natural plant community (PNC). See definition of "State" in Concepts section (IIRH, Version 4).

Rehabilitation: an activity that emphasizes the reparation of ecosystem processes, productivity and services (SER, 2002).

Relative dominance (composition): The percent of cover or production represented by a species or lifeform expressed relative to the total cover or production. It can also be based on biomass (IIRH, Version 4).

Relict area: A remnant or fragment of the historic climax plant community that remains from a former period when it was more widely distributed (Habich, 2001).

Remote Sensing: The technique of collecting information from a distance. Most common mediums used are aerial photography and satellite imagery.

Resilience: The capacity of ecological processes to recover following a disturbance. Resilience can be defined in terms of the rate of recovery, the extent of recovery during a particular period of time, or both (IIRH, Version 4).

OR... the ability of an ecosystem to regain structural and functional attributes that have suffered harm from stress or disturbance (SER, 2002).

Resistance: The capacity of ecological processes to continue to function without change following a disturbance (IIRH, Version 4).

OR... an ecosystem's ability to maintain its structural and functional attributes in the face of stress and disturbance (SER, 2002).

Resolution: Resolution refers to the smallest viewable picture element (i.e., pixels) captured by a satellite or aerial sensor. A one-meter image has pixels that represent an area one meter by one meter on the ground. The highest resolution commercial satellites now aloft and operational carry two-foot sensors. At this resolution automobiles, boats, homes, trees, roads, and trails are easily detected. Aerial imagery can be flown and processed at resolution of three inches per pixel. (Resource Strategies, Inc., 2005.)

Resource use level: the level of use allowed within an area, based on the desired outcomes and land use allocations in the land use plan. Targets or goals for resource use levels are established on an area-wide or broad watershed level in the land use plan. Site-specific resource use levels are normally determined at the implementation level, based on site-specific resource conditions and needs as determined through resource monitoring and assessments (BLM H-1601-1, 2005)

Rhizomatous plant: A plant that develops clonal shoots by producing rhizomes. Rhizomes are horizontal underground stems that usually produce roots and shoots from nodes (SRM 1999).

Rill: A small intermittent water course with steep sides, usually only several centimeters deep. Rills generally are linear erosion features (Habich, 2001).

Riparian zone: The banks and adjacent areas of water bodies, water courses, seeps, and springs whose waters provide soil moisture sufficiently in excess of that otherwise available locally so as to provide a more moist habitat than that of contiguous flood plains and uplands (Habich, 2001).

Runoff: The portion of precipitation or irrigation on an area which does not infiltrate, but instead is discharged by the area (SSSA 1997).

Sagebrush Areas: Areas with generally at least 5% sagebrush canopy cover.

Sagebrush Obligate Species: Species that use only sagebrush habitat to meet all life requirements (Paige and Ritter 1999, Knick et al. 2003). (Ask WO230 about reference)

Saltation: A particular type of momentum-dependent transport involving the rolling, bouncing, or jumping action of soil particles 0.1 to 0.5 mm in diameter by wind, usually at a height of <15 cm above the soil surface, for relatively short distances; the rolling, bouncing or jumping action of mineral grains, gravel, stones, or soil aggregates affected by the energy of following water; the bouncing or jumping movement of material downslope in response to gravity (SSSA 1997).

Sample: A set of sampling units as opposed to a single measurement Habich, 2001).

Scientific assessment: Under the Data Quality Act, an evaluation of a body of scientific or technical knowledge, which typically synthesizes multiple factual inputs, data, models, assumptions, and/or applies best professional judgment to bridge uncertainties in the available information, including state-of-science reports, meta-analyses, risk assessments, and others.

Scientific information: Under the Data Quality Act, factual inputs, data, models, analyses, technical information, or scientific assessments based on the behavioral and social sciences, public health and medical sciences, life and earth sciences, engineering, or physical sciences; any communication or representation of knowledge such as facts or data, in any medium or form.

Seral community: See seral stage.

Seral stage: The developmental stages of an ecological succession; synonymous with successional stage (Habich, 2001).

Shrub: A plant that has persistent woody stems and a relatively low growth habit, and that generally produces several basal shoots instead of a single bole. It differs from a tree by its low stature, less than 5 meters (16 feet), and nonarborescent form (Habich, 2001).

Similarity index (rangeland): The present state of vegetation and soil protection on an ecological site in relation to the historic climax plant community. *Synonym:* range condition. (SRM, 1999).

Slope aspect: The predominate direction of slope of the land (Habich, 2001).

Soil: The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants. The unconsolidated mineral matter on the surface of the earth that has been subjected to and influenced by genetic and environmental factors of parent material, climate (including moisture and temperature effects), macro and microorganisms, and topography (Habich, 2001).

Soil aggregates: A group of primary soil particles that cohere to each other more strongly than to other surrounding particles (SSSA, 1997).

Soil association: A kind of map unit used in soil surveys comprised of delineations, each of which shows the size, shape, and location of a landscape unit composed of two or more kinds of component soils or component soils and miscellaneous areas, plus allowable inclusions. The individual bodies of component soils and miscellaneous areas are large enough to be delineated at the scale of 1:24,000. Several bodies of each kind of component soil or miscellaneous areas are apt to occur in each delineation, and they occur in a fairly repetitive and describable pattern (Habich, 2001).

Soil classification: The systematic arrangement of soil units into groups or categories on the basis of their characteristics. Broad groupings are made on the basis of general characteristics and subdivisions on the basis of more detailed differences in specific properties (Habich, 2001).

Soil complex: A kind of map unit used in soil surveys comprised of delineations, each of which shows the size, shape, and location of a landscape unit composed of two or more kinds of component soils or component soils and a miscellaneous area, plus allowable inclusions in either case. The individual bodies of component soils and miscellaneous areas are too small to be delineated at the scale of 1:24,000. Several to numerous bodies of each kind of component soil or miscellaneous area are apt to occur in each delineation (SSSA, 1997).

Soil inclusion: One or more polypedons or parts of polypedons within a delineation of a map unit, not identified by the map unit name (i.e., it is not one of the named component soils or named miscellaneous area components). Such soils or areas are either too small to be delineated separately without creating excessive map or legend detail, occur too erratically to be considered a component, or are not identified by practical mapping methods (Habich, 2001).

Soil map unit: A collection of soil areas or miscellaneous areas delineated in a soil survey. They may encompass one or more kinds of soil or one or more kinds of soil and miscellaneous areas, such as a rock outcrop. They are identified by a unique map symbol in a survey area. There are four kinds of map units: consociations, complexes, associations, and undifferentiated groups (Habich, 2001).

Soil/site stability: The capacity of a site to limit redistribution and loss of soil resources (including nutrients and organic matter) by wind and water (one of the three attributes of rangeland health).

(IIRH, Version 4)

Soil structure: The combination or arrangement of primary soil particles into secondary units or peds. The secondary units are characterized on the basis of size, shape, and grade (degree of distinctiveness) (SSSA, 1997).

Soil survey: The systematic examination, description, classification, and mapping of soils in an area. Soil surveys are classified according to the kind and intensity of field examination (Habich, 2001).

Soil texture: The relative proportions of the various soil separates (sand, silt, and clay) in a soil (SSSA 1997).

Species composition: The proportions of various plant species in relation to the total on a given area. May be expressed in terms of relative cover, relative density, or relative weight (Habich, 2001).

*OR...*the taxonomic array of species present (SER, 2002).

Species redundancy: the presence of multiple species that play similar roles in ecosystem dynamics (SER, 2002).

Species richness: the number of different species present (SER, 2002).

Standing dead vegetation: The total amount of dead plant material, in aboveground parts, per unit of space, at a given time. (USDA 1997). This component includes all standing dead vegetation produced in the previous (not the current) growing season that is not detached from the plant and is still standing.

State: A recognizable, resistant, and resilient complex of soil and vegetation (Habich, 2001).

*OR...*A state is comprised of an integrated soil and vegetation unit having one or more biological communities that occur on a particular ecological site and that are functionally similar with respect to the three attributes (soil/site stability, hydrologic function, and biotic integrity) under natural disturbance regimes. (IIRH, Version 4).

State Implementation Plan (SIP): a document developed by each state government, and approved by EPA, which provides for the implementation, maintenance, and enforcement of air quality laws, standards, regulations, programs, and air pollution control strategies. Similar documents are called Federal Implementation Plans (FIPs) or Tribal Implementation Plans (TIPs).

Steady state: Vegetation states that are resistant to change. These plant communities change only as a result of a natural event that is beyond the normal range of events or normal human actions (Habich, 2001).

Stratification: the grouping together of similar site write-up areas (SWA) for sampling purposes. SWAs must have the same ecological site, forestland ecological site, or forest type in the same successional status class, or present vegetation community (Habich, 2001).

Stressors: physical, chemical, or biological perturbations to a system that are either (a) foreign to that system or (b) natural to the system but applied at an excessive [or deficient] level (Barrett et al. 1976:192). Stressors cause significant changes in the ecological components, patterns and processes in natural systems. Examples include water withdrawal, pesticide use, timber harvesting, traffic emissions, stream acidification, trampling, poaching, land-use change, and air pollution. (NPS I&M website glossary)

OR... external processes that stress the biota of an ecosystem. Sometimes called disturbance or perturbation (SER, 2002).

Structure (soil): The combination or arrangement of primary soil particles into secondary units or pedons. Secondary units are characterized on the basis of size, shape, and grade (degree of distinctness) (Habich, 2001).

Structure (vegetation): The height and area occupied by different plants or life forms in a community (Habich, 2001).

Subdominant (subordinate) species: Daubenmire (1968) defines subordinate species as "those species, which if removed singly, would not occasion much rearrangement with their ecosystem." For the purposes of this document, *Interpreting Indicators of Rangeland Health*, subdominant plants are those within a community with less size-per-unit area as measured by biomass, production, or cover (IIRH, Version 4).

Succession: The progressive replacement of plant communities on a site that leads to the potential natural plant community (i.e., attaining stability). Primary succession entails simultaneous succession of soil from parent material and vegetation. Secondary succession occurs following disturbances on sites that previously supported vegetation and entails plant succession on the more mature soils (Habich, 2001).

Successional status: The present state of vegetation and soil protection of an ecological site in relation to the potential natural community for the site. Successional status is the expression of the relative degree to which kinds, proportions, and amounts of plants in a community resemble that of the potential natural community. The four classes of successional status ratings, expressed in terms of similarity to the potential natural community, are: 0-25 percent early seral class, 26-50 percent mid seral, 51-76 percent late seral and 76-100 percent PNC (Habich, 2001).

Succulent: Juicy, watery or pulpy, as the succulent stems of cacti (Habich, 2001).

OR... Generally a type of cactus (IIRH, Version 4).

Sustainable cultural practices: traditional human land uses that maintain biodiversity and productivity (SER, 2002).

Swath:

Terracette: "Benches" of soil deposition behind obstacles caused by water erosion (IIRH, Version 4).

Threshold: The boundary between any and all states, or along irreversible transitions, such that one or more primary ecological processes has been irreversibly changed and must be actively restored before returning to a previous state is possible (Habich, 2001).

Appendix B: Glossary of Terms for Assessment, Inventory, and Monitoring

OR... A transition boundary that an ecosystem crosses resulting in a new stable state that is not easily reversed without significant inputs of resources (IIRH, Version 4).

Tiller: A plant shoot that arises from the root or base of a plant (IIRH, Version 4).

Transformation: the conversion of an ecosystem to a different type of ecosystem of land use type (SER, 2002).

Transition: A shift in plant composition that results in relatively stable states, as reflected in composition and structure. These shifts can occur by natural forces or as a result of human actions (Habich, 2001).

OR... A shift between two states. Transitions are not reversible by simply altering the intensity or direction of factors that produced the change. Instead, they require new inputs such as revegetation or shrub removal. Practices, such as these, that accelerate succession (USDA 1997) are often expensive to apply.

Transition pathway: The mechanism that causes a change in plant community from one steady state to another (e. g., fire, drought, grazing, rest, chemical and mechanical treatment) (Habich, 2001).

Tree: A woody perennial, usually single-stemmed plant that has a definite crown shape and characteristically reaches a mature height of at least 5 meters (16 feet). Some plants, such as oaks (*Quercus* spp.), may grow as either trees or shrubs (Habich, 2001).

Trend: The direction of change in ecological status or resource value rating observed over time (Herrick et al. 2005). (Ask WO230 about reference)

OR... as used by this program, refers to directional change measured in resources by monitoring their condition over time. Trends can be measured by examining individual change (change experienced by individual sample units) or by examining net change (change in mean response of all sample units). (NPS I&M website glossary)

Unhealthy rangelands: Rangelands on which degradation has resulted in the loss of ecological processes that function properly, and the capacity to provide values and commodities to a degree that external inputs are required to restore the health of the land (NRC 1994) (IIRH Volume 4).

Uses: utility of public land that may be authorized, allowed, or unauthorized. Uses include permitted activities such as livestock grazing, oil and gas development, and special recreation events for which case files exist. Uses also include activities that are allowed but not specifically permitted by the BLM, such as many dispersed recreation activities (Working definition). Also see definition for resource use level.

Users: Those individuals or groups utilizing public lands for authorized, allowed, or unauthorized uses. See definitions for uses and resource use level (working definition).

Vascular plant: Plants with vessels that conduct sap throughout the plant (Habich, 2001).

Vegetation: Plants in general, or the sum total of the plant life above and below ground in an area (Habich, 2001).

Vegetation attribute: The quantitative features or characteristics of vegetation that describe how many, how much, or what kind of plants are present. The most commonly used attributes are frequency, cover, density, production, structure, and composition (Habich, 2001).

Vegetation manipulation practices: Practices that are directed at changing vegetation production, species composition, and erosion control. These practices include root plowing, seeding, pitting, chaining, prescribed fire, herbicide application, prescribed grazing, and livestock exclusion (Habich, 2001).

Vegetation type: A kind of plant community with distinguishable characteristics described in terms of the present vegetation that dominates the aspect or physiognomy of the area (Habich, 2001).

Vesicular crust: A type of physical crust that contains numerous small air pockets or spaces similar to a sponge causing a reduction in infiltration (IIRH, Version 4).

Viable seed: Wildland plant seed that is capable of germination given appropriate environmental conditions (IIRH, Version 4).

Visibility: the optical quality of the atmosphere, sometimes quantified as the Visual Range, or the maximum distance at which it is just possible to differentiate (with the unaided eye) a prominent dark object against the horizon sky. Other measurement units include extinction (how light attenuates as it passes through the atmosphere) and deciviews (where 1.0 to 2.0 deciviews represent a just noticeable change in optical conditions under specific conditions.)

Vital Signs: are a subset of physical, chemical, and biological elements and processes of park ecosystems that are selected to represent the overall health or condition of park resources, known or hypothesized effects of stressors, or elements that have important human values. The elements and processes that are monitored are a subset of the total suite of natural resources that park managers are directed to preserve "unimpaired for future generations," including water, air, geological resources, plants and animals, and the various ecological, biological, and physical processes that act on those resources. Vital signs may occur at any level of organization including landscape, community, population, or genetic level, and may be compositional (referring to the variety of elements in the system), structural (referring to the organization or pattern of the system), or functional (referring to ecological processes). (NPS, I&M website glossary)

Warm season plants: Plants whose major growth occurs during the spring, summer, or fall and that are usually dormant in winter (Habich, 2001).

OR... A plant which makes most or all its growth during the spring, summer, and fall, and is usually dormant in winter; a plant that exhibits the C-4 photosynthetic pathway (SRM, 1999).

Water cycle: The capture, storage, and redistribution of precipitation (Habich, 2001).

Watershed: Any area of land that drains to a common point. A watershed is smaller than a river basin or subbasin, but it is larger than a drainage or site. The term generally describes areas that result from the first subdivision of a subbasin, often referred to as a "fifth field watershed" (DOA/DOI, Regional Ecosystem Office 1995). (Ask WO230 about this reference).

OR... The total area of land above a given point on a waterway that contributes runoff water to the flow at that point. A major subdivision of a drainage basin (Habich, 2001).

Weather: The current state of the atmosphere with regard to wind, temperature, cloudiness, moisture, and atmospheric pressure (Habich, 2001).

Well-managed rangelands: Rangelands that have properly functioning ecological processes, biotic integrity, and soil stability associated with human uses of the land (IIRH, Version 4).

Wind-scoured area: Areas, generally in interspaces, where the finer soil particles have blown away sometimes leaving residual gravel, rock, or exposed roots on the soil surface (IIRH, Version 4).

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STATUTES

Clean Water Act of 1972, as amended: 33 U.S.C. 1251 *et seq.* The Federal Water Pollution Control Act, popularly known as the Clean Water Act, is a comprehensive statute aimed at restoring and maintaining the chemical, physical and biological integrity of the nation's waters at a quality which provides protection for fish, shellfish, wildlife, and recreational use. It also requires States to assess their rivers, streams, and lakes and to develop non-point source management programs to control and reduce specific non-point sources of pollution.

Data Quality Act of 2001 and "Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies" 2002: Public Law 106-554 and OMB guidelines, Federal Register 8452, February 22, 2002. Agencies are directed to develop information resources management procedures for reviewing and substantiating the quality (including the objectivity, utility, and integrity) of information before it is disseminated. These guidelines stress the importance of having agencies apply these standards and develop their administrative mechanisms so they can be implemented in a common sense and workable manner. Four substantive terms regarding information disseminated by Federal agencies are included in the Act: quality, utility, objectivity, and integrity.

Endangered Species Act of 1973, as amended: 16 U.S.C. 1531 *et seq.* Section 6 directs each Federal Agency to conduct biological assessments for the purpose of identifying any endangered or threatened species. Section 7 directs all federal agencies to insure that any action authorized, funded or carried out by the agency (agency action) is not likely to jeopardize the continued existence of an endangered or threatened species, or result in destruction or adverse modification of a critical habitat of a species. Agencies are required to use the best scientific and commercial data available to fulfill this charge. If, based on the best scientific and commercial data available, the Secretary determines that such species are present, the agency must conduct a biological assessment to identify the species likely to be affected (IPL, 2006).

Energy Policy Act of 2005: Public Law 109-58. The Act requires the inventory and assessment of renewable and non-renewable energy resources on federal lands.

Federal Land Policy Management Act of 1976, as amended: 43 U.S.C. 1701 *et seq.* The Act further directs the Secretary of the Interior to take any action necessary to prevent "unnecessary or undue degradation of the lands" (Section 302 (b)) and to manage the land "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values" (Section 102 (8)). This Act requires that public lands and their resources be periodically and systematically inventoried and that an evaluation of the current natural resource use and values is made of public and adjacent non-public land. Section 201(a) of the Act requires the Secretary of the Interior "to prepare and maintain on a continuing basis an inventory of all public lands and their values ... This inventory shall be kept current so as to reflect changes in conditions and to identify new and emerging resource and other values" (IPL, 2006).

Fish and Wildlife Coordination Act of 1934, as amended: 16 U.S.C. 661 *et seq.* This act authorizes surveys and investigations of the wildlife on public domain lands including lands and waters of interest therein acquired or controlled by any agency of the United States (IPL, 2006).

Forest and Rangeland Renewable Resources Research Act of 1978, and as amended by Forest Ecosystems and Atmospheric Pollution Research Act of 1988 and the Food Agriculture, Conservation, and Trade Act of 1990: 16 U.S.C. 1641 *et seq.* This Act provides the Secretary authority to conduct, support, and cooperate in investigations, tests, and other activities necessary to obtain, analyze, develop, demonstrate, and disseminate scientific information about protecting, managing, and utilizing forest and rangeland renewable resources in rural, suburban, and urban areas. It authorizes the development and implementation of improved methods of survey and analysis of forest inventory information. In addition, it authorizes a determination of the cause of changes in the health and productivity of domestic forest ecosystems and to monitor and evaluate the effects of atmospheric pollutants on such ecosystems (IPL, 2006).

Healthy Forests Restoration Act of 2003: 16 U.S.C. 6501 *et seq.* One purpose of this Act is to promote systematic gathering of information to address the impact of insect and disease infestations and other damaging agents on forest and rangeland health. Additionally, for each Forest Service administrative region and each Bureau of Land Management State Office, the Secretary shall monitor the results of a representative sample of the projects authorized under this title for each management unit; and not later than 5 years after the date of enactment of this Act, and each 5 years thereafter, issue a report that includes an evaluation of the progress towards project goals; and recommendations for modifications to the projects and management treatments. The results of a monitoring report shall be made available for use (if appropriate) in an authorized hazardous fuels reduction project conducted in a similar vegetation type on land under the jurisdiction of the Secretary. Monitoring and assessment shall include a description of the changes in condition class, using the Fire Regime Condition Class Guidebook or successor guidance. In an area where significant interest is expressed in multiparty monitoring, the Secretary shall establish a multiparty monitoring, evaluation, and accountability process in order to assess the positive or negative ecological and social effects of authorized hazardous fuel reduction projects.

National Historic Preservation Act of 1966, as amended: 16 U.S.C. 470, *et seq.* Procedures to be followed by Federal Land managers in providing protection for archaeological resources located on public lands. The Secretary shall, at least once every 4 years, in consultation with the Council and with State Historic Preservation Officers, review significant threats to properties included in, or eligible for inclusion on, the National Register, in order to: (A) determine the kinds of properties that may be threatened; (B) ascertain the causes of the threats; and (C) develop and submit to the President and Congress recommendations for appropriate action.

National Trails System Act of 1968, as amended: 16 U.S.C. 1241 *et seq.* This Act creates a national system of trails of recreation and preservation of outdoor areas. The system consists of national recreation trails, national scenic trails, national historic trails and connecting or side trails. The Secretary of the Interior must submit biennially to Congress a National Trails System plan. This plan must indicate the scope and extent of the completed nationwide system of trails. The Secretary of the Interior or the Secretary of Agriculture, as appropriate, must undertake additional studies to determine the feasibility of designating other trails as national scenic or national historic trails (IPL, 2006).

National Environmental Policy Act of 1969, as amended: 42 U.S.C. 4321 *et seq.* Under NEPA, Congress requires that all federal agencies include a detailed environmental impact statement (EIS) in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment. An EIS must include an examination of the environmental impacts of the proposed action, any unavoidable adverse environmental effects and alternatives available to the proposed action. Agencies must examine and include the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity and any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. Prior to preparing an EIS, the agency must consult with other federal agencies having expertise on any environmental impact involved. BLM compliance with this act necessitates monitoring in order to demonstrate environmental effects. Executive Order Number 11991 declares that, consonant with Title I of the National Environmental Policy Act of 1969, the heads of Federal agencies shall "(a) Monitor, evaluate, and control on a continuing basis their agencies' activities so as to protect and enhance the quality of the environment. Such activities shall include those directed to controlling pollution and enhancing the environment and those designed to accomplish other program objectives which may affect the quality of the environment."

Public Rangelands Improvement Act of 1978: 43 U.S.C. 1901 *et seq.* This Act establishes a national policy and commitment to improve the conditions on public rangelands, requires a national inventory and consistent federal management policies, and provides funds for range improvement projects. It also amends the Wild Free-Roaming Horses and Burros Act and the Federal Land Policy and Management Act of 1976, both of which are summarized in this section. BLM compliance with this act necessitates monitoring in order to share information and demonstrate rangeland improvements. The Act states that "the Secretary of the Interior and the Secretary of Agriculture shall update, develop (where necessary), and maintain on a continuing basis an inventory of range conditions and record of trends of range conditions on the public rangelands, and shall categorize or identify such lands on the basis of the range conditions and trends thereof as they deem appropriate. Such inventories shall be conducted and maintained by the Secretary as part of the inventory process required by Section 201 (a) of the Federal Land Policy and Management Act, and by the Secretary of Agriculture in accordance with section 1603 of title 16; shall be kept current on a regular basis so as to reflect changes in range conditions; and shall be available to the public."

Soil and Water Conservation Act of 1977, as amended: 16 U.S.C. 2001 *et seq.* Section 5 authorizes the Federal Government to obtain and maintain information of the current status of soil, water, and related resources. The act further requires an integrated system capable of using combinations of resource data to determine the quality and capabilities for alternative uses of the resource base and to identify areas of local, State, and National concerns.

Taylor Grazing Act of 1934: 43 U.S.C. 315 *et seq.* This Act was the first federal effort to regulate grazing on federal public lands. It establishes grazing districts and uses a permitting system to manage livestock grazing in the districts. The Act also provides for the classification of lands for particular uses (IPL, 2006).

Wild Free-Roaming Horses and Burros Act of 1971, as amended: 16 U.S.C. 1331 *et seq.* The Act directs the Secretaries to protect and manage wild free-roaming horses and burros as components of the public lands. Wild horses and burros are to be managed in a manner designed

to achieve and maintain ecological balance on the public lands. The Secretary must maintain a current inventory of wild free-roaming horses and burros on given areas of the public lands (IPL, 2006).

Wild and Scenic Rivers Act of 1968, as amended: 16 U.S.C. 1271 *et seq.* This Act requires Federal land management agencies to identify potential river systems and then study them for potential designation as wild, scenic, or recreational rivers.

Wilderness Act of 1964, as amended: 16 U.S.C. 1131 *et seq.* The Wilderness Act established the National Wilderness Preservation System. The Secretary of the Interior was directed to review every roadless area of 5,000 acres or more and every roadless island within the national wildlife refuge and national park systems for possible inclusion in the System. Section 3 permits the gathering of resource information in wilderness areas. Each agency administering any wilderness area is responsible for preserving the area's wilderness character (IPL, 2006).

MANUAL GUIDANCE

The following manual sections are not inclusive of the sections reviewed or of all the sections that potentially have AIM-related guidance. Manual sections will be added as additional guidance is located. A searchable Access database is being developed that will link program, guidance, and BLM recognized techniques to facilitate understanding and conformance to recognized protocol. This database will be posted on the AIM Strategy web page under the Guidance heading at <http://web.blm.gov/internal/wo-200/wo-210/monitor.htm> when complete.

MS	Title	Release	Date
1200 - Administrative Management			
1283	Data Administration and Management	1-1678	11/25/2002
Provides policy and guidelines in the effective management of data collected and used to support BLM mission. This policy is to ensure the data BLM collects, uses, and disseminates relates to its mission. Requires controls to establish standards, quality control, and assurance for data oversight and monitoring.			
1600 - Planning, Programming, and Budgeting			
1601	Land Use Planning	1-1666	11/22/2002
Provides guidance for preparing new Resource Management Plans (RMPs), plan revisions, plan amendments, other equivalent plans, and subsequent implementation-level plans. This guidance integrates LUP with NEPA.			
H-1601-1	Land Use Planning Handbook	1-1693	03/11/2005
Provides guidance for preparing, revising, amending, and maintaining land use plans. Provides guidance for developing subsequent implementation plans and decisions.			
1613	Areas of Critical Environmental Concern	1-1541	9/29/1988
Provides policy and procedural guidance on identification, evaluation, and designation of ACEC in RMPs and monitoring and management of same.			
H-1624-1	Planning for Fluid Mineral Resources	1-1583	05/07/1990
Provide guidance on for fluid mineral determinations required in RMPs and EA or EIS guidance.			
1700 - Program Management			
1734	Inventory and Monitoring Coordination	1-1335	07/27/83
Establishes bureau-wide objectives, policies, and standards for coordination of resource inventory, monitoring, and evaluation activities.			
1737	Riparian-Wetland Area Management	1-1611	10/12/1992
Describes the policies, responsibilities, and guidance for the identification, protection, restoration, and maintenance, of fresh, brackish, and saline water wetland areas. Riparian areas are a form of wetland transitional between permanently saturated wetlands and upland areas.			
1740	Renewable Resource Improvements and Treatments	1-1427	09/03/1985
Identify objectives, policies, and standards that are common and apply to planning, analyzing,			

constructing, maintaining, replacing, and/or modifying renewable resource improvements and treatment for the forestry range management, soil, water, air, fish and wildlife, and wild horse and burro programs to achieve management objectives on BLM managed lands.

H-1740-1	Renewable Resource Improvement and Treatment Guidelines and Procedure	1-1509	12/07/1987
Supplements MS 1740 by incorporating permanent guidance on rangeland, wildlife, and watershed investments.			

Appendix D: Manual Sections Containing AIM-Related Guidance

MS	Title	Release	Date
1700 - Program Management, Continued			
1742	Emergency Fire Rehabilitation	1-1423	08/08/1985
Provides objectives, policies, procedural directions, and standards for Emergency Fire Rehabilitation.			
H-1742-1	Emergency Fire Rehabilitation	1-1424	08/08/1985
Describes the process to be used to develop a Normal Fire rehabilitation Plan (NFRP) based on past fire occurrence, potential damage to resource values, land-use planning objectives, decisions, and available resource data.			
1745	Introduction, Transplant, Augmentation, Reestablishment of Fish, Wildlife, and Plants	1-1603	03/26/1992
Provides guidance on the introduction of exotic species and the transplant, augmentation, reestablishment of native species and naturalized exotic species. Exotic organisms for use as Biological control Agents must meet the requirements outlined in MS 9014.			
3000 - Minerals Management			
3060	Mineral Reports - Preparation and Review	3-284	04/07/1994
Provides minimum standards for preparing, reviewing, and approving energy and mineral resources reports in response to a specific action or application. This is not intended to provide guidance on how to conduct technical evaluations which is covered in individual program manuals and handbooks.			
4000 - Range Management			
4010	Range Management Program Records	4-87	07/26/1988
Provides procedural direction and standards for establishing and maintaining range management program records. Includes documents necessary for reporting on ecological status and trends			
H-4010-1	Range Management Records	4-88	07/26/1988
Provides direction and standards for the management of range program recordkeeping.			
4100 - Grazing Administration - Exclusive of Alaska			
4100	Qualifications and Preference	4-96	02/16/1989
Sets forth the objectives and policies for BLM livestock grazing administration and management program, exclusive of Alaska.			
4180	Rangeland Health Standards	4-106	01/19/2001
Describes the authorities, objectives, and policies that guide the implementation of the Healthy Rangeland Initiative			
H-4180-1	Rangeland Health Standards Manual Handbook	4-107	1/19/2001
Provides specific direction for implementing the policies listed in the 4180 MS and the Healthy Rangelands Initiative.			
4400 - Rangeland Inventory, Monitoring, and Evaluation			
4400	Rangeland Monitoring and Evaluation	4-97	11/28/1989

Establishes policies, objectives, and internal operating procedures for applying and reporting rangeland inventory, monitoring, and evaluation relating to the effects of rangeland management actions on soils, vegetation, and water resources.			
H-4400-1	Rangeland Monitoring and Evaluation	4-98	11/28/1989
Provides procedural direction and standards for rangeland monitoring and evaluation on the public lands or other lands.			
H-4410-1	National Range Handbook	4-101	05/25/1990
Guidance on ecological site concept, data collection procedures, and how the ecological site data are used in the rangeland management program			
MS	Title	Release	Date
5000 - Forest Management			
5000-1	Forest Management (Public Domain)	5-139	10/28/1991
Provides guidance for maintenance, restoration, improvement, harvest, and replacement of forest vegetation and management for desired plant communities.			
5300 - Timber Measurement			
5310	Timber Cruising	5-114	08/03/1982
Provides guidance for policies, standards, and guidelines for applying timber cruise measurement systems			
6500 - Wildlife Management			
6500	Wildlife Management	6-114	6/17/1988
Provide guidance for the wildlife and fisheries program. Program authorities are summarized, key policies identified, and program goals and objectives outlined.			
6501	Wildlife Reports	6-70	10/07/1980
To obtain an estimate of wildlife habitat and population conditions, trends, and management status and to provide data on the Bureau's wildlife program accomplishments for BLM administered lands.			
6600 - Fish, Wildlife, and Special Status Plant Resources Inventory and Monitoring			
6600	Fish, Wildlife, and Special Status Plant Resources Inventory and Monitoring	6-117	08/02/1990
Provide policy and direction for conducting inventory and monitoring of fish, wildlife, and special status plants, and supplement guidance in BLM manual Section 1734-Inventory and Monitoring Coordination			
6602	Integrated Habitat Inventory and Classification System	6-87	03/26/1982
Establishes the Integrated Habitat Inventory and Classification System (IHICS) to be used for managing wildlife resources			
6674	Water Analysis for Fisheries	6-50	09/23/1975
Provides instructions for collections and analysis of water samples as part of an intensive inventory and analysis.			
7000 - Soil, Water, and Air Management			

Appendix D: Manual Sections Containing AIM-Related Guidance

7000	Soil, Water, and Air Management	7-85	03/08/1984
Provides policy and guidance for the management of soil, water, and air resources and watershed values.			
7100 - Soil Resource Management			
7100	Soil Resource Management	7-87	08/15/1984
Provides policy on the conduct of soil surveys and their related functions.			
9200 - Protection			
9211	Fire Planning	9-273	06/02/1987
An operational plan which describes the purpose, resource and fire objectives, and operational procedures required to properly plan, safely implement, monitor, and evaluate fire and resource objectives for this treatment.			

TECHNICAL REFERENCES

The following technical references are not inclusive and additional reference will be added as they are identified. A searchable Access database is being developed that will link programs, guidance, and BLM recognized techniques to facilitate understanding and conformance to recognized protocol. This database will be posted on the AIM Strategy web page under the Guidance heading at <http://web.blm.gov/internal/wo-200/wo-210/monitor.htm> when complete.

TR Number	TR Name	Date	TR Web address
TR 1734-3	Utilization Studies and Residual Measurements		http://www.blm.gov/nstc/library/pdf/utilstudies.pdf
To provide the basis for consistent, uniform, and standard utilization studies and residual measurements that are economical, repeatable, statistically reliable, and technically adequate			
TR 1734-4	Sampling Vegetation Attributes		http://www.blm.gov/nstc/library/pdf/sampleveg.pdf
To provide the basis for consistent, uniform, and standard vegetation attribute sampling that is economical, repeatable, statistically reliable, and technically adequate			
TR 1734-6	Interpreting Indicators of Rangeland Health		http://www.blm.gov/nstc/library/pdf/1734-rev05.pdf
Provide a preliminary evaluation of soil/site stability, hydrologic function, and biotic integrity (at the ecological site level).			
TR 1734-7	Ecological Site Inventory		http://www.blm.gov/nstc/library/pdf/1734-7.pdf
Identifies procedures for completing an ecological site inventory and to describe the technique used by the Natural Resources Conservation Service (NRCS) to document and describe ecological sites.			
TR 1737-3	Riparian Area Management - Inventory and Monitoring		http://www.blm.gov/nstc/library/pdf/Final%20TR%201737-03.pdf
Purpose is to assist in the determination of specific inventory and monitoring needs			
TR 1737-7	Riparian Area Management- Ecological Site Inventory		http://www.blm.gov/nstc/library/pdf/Final%20TR%201737-7.pdf
Purpose is to detail field procedures for describing and documenting ecological site information as it applies to the interaction between soils, climate, hydrology, and vegetation for riparian-wetland resources and uplands.			
TR 1737-8-2ed	Monitoring the Vegetation Resources in Riparian Areas		http://www.blm.gov/nstc/library/pdf/Final%20TR%201737-8%20-%20Winward.pdf
Provides procedures intended to be used as follow-up methods to the Riparian Proper Functioning			

(PFC) Assessment when more quantitative information is desired			
TR 1737-9	Riparian Area Management- Assessing PFC	1998	http://www.blm.gov/nstc/library/pdf/Final%20TR%201737-9.pdf
Purpose of this document is to provide a thought process for assessing PFC for riparian-wetland areas			

TR Number	TR Name	Date	TR Web address
TR 1737-10	Riparian Area Management-Aerial Photography		http://www.blm.gov/nstc/library/pdf/Final%20TR%201737-10.pdf
Provides suggestions for the use of various scales of photography, guidance for acquiring aerial photography, and general procedures for conducting a vegetation inventory.			
TR 1737-11	Riparian Area Management-Lentic Areas, See also TR 1737-16		http://www.blm.gov/nstc/library/pdf/Final%20TR%201737-11.pdf
Purpose of this document is to provide a thought process for assessing PFC for lentic riparian-wetland areas			
TR 1737-12	Riparian Area Management, Aerial Photography		http://www.blm.gov/nstc/library/pdf/Final%20TR%201737-12.pdf
Purpose of this document is to provide a procedure for using aerial photography to assess the condition of riparian-wetland areas			
TR 1737-13	Observing Physical and Biological Change through Historical Photographs		http://www.blm.gov/nstc/library/pdf/Final%20TR%201737-13.pdf
To provide information, concepts, and procedures associated with using historical photographs to assess changes in response to possible change agents			
TR 1737-15	Riparian Area Management-Lotic Areas		http://www.or.blm.gov/nrst/Tech_References/Final%20TR%201737-15.pdf
Provides a consistent approach for considering hydrology, vegetation, and erosion/deposition (soils) attributes and processes to assess the condition of riparian-wetland areas			
TR 1737-16	Riparian Area Management-Lentic Areas, Supplements TR 1737-11		http://www.or.blm.gov/nrst/Tech_References/Final%20TR%201737-16%20.pdf
Provides guidance for assessing the condition of any riparian-wetland area other than a lotic (riverine) area and assessing the condition using PFC of riparian wetland areas			
TR 1737-19	Riparian-Wetland Soils		http://www.blm.gov/nstc/library/pdf/FinalTR1737-19.pdf
Provides guidance for assessing the condition of both lotic and lentic riparian-wetland areas and soils information that can be interpreted and applied in understanding, managing, and protecting riparian-wetland soils			

Appendix E: BLM and Inter-Agency AIM Technical References

TR 1737-21	Riparian and Wetland Classification	http://www.blm.gov/nstc/library/pdf/1737-21.pdf
Presents a general discussion of several areas of classification related to riparian and wetland management and provides guidance on applying classification to solve land management problems		
TR 1737-22	Riparian Restoration USFS0423 1201-SDTDC	http://www.blm.gov/nstc/library/pdf/Final%20TR%201737-22.pdf
The objectives are to create an awareness, show common impacts, provide planning, design, and restoration techniques and an understanding of adapted management and of monitoring.		

Appendix E: BLM and Inter-Agency AIM Technical References

TR Number	TR Name	Date	TR Web address
TR 9113-1	Planning and Conducting Route Inventories		http://www.blm.gov/nstc/library/pdf/TR9113-1.pdf
Describes best practices for planning and conducting transportation related route inventories			
	Interagency Fire Regime Condition Class		http://www.frcc.gov
Provide tools for fire, vegetation, and fuels assessment and management at both the landscape and stand levels. These methods are used to describe general landscape fire regime and vegetation-fuel characteristics.			
	Stream Channel Methods for Core Attributes		http://www.fs.fed.us/biology/resources/pubs/feu/2004_final_aremp_protocol.pdf
Achieve consistency in data collection between the large-scale aquatic monitoring to answer status and trend questions			
	Aquatic and Riparian Effectiveness Monitoring Plan		http://www.fs.fed.us/biology/fishecolgy/emp/
Presents options and guidelines to evaluate status and trends of watershed, stream, and riparian conditions			

OMB Direction Regarding Assessments, Inventories, and Monitoring

Date	Review	Finding/Direction
November, 2006	FY 2008 Passback	Resource Monitoring OMB has supported past BLM-requested funding increases for monitoring to improve baseline data and understanding of the impacts of various resource uses as well as BLM actions. A lack of understanding of resource conditions was a weakness identified in the 2004 PART on BLM's restoration programs and again in this year's Resource Management PART. Implementation of a comprehensive monitoring plan should be an agency priority. The agency should work with OMB to identify base funds that may be consolidated to improve collection, management, reporting, dissemination, and use of monitoring data. BLM should provide to OMB a status report on its monitoring efforts by February 23, 2007.
Assessment Year 2006	FY 2008 Program Assessment Rating Tool - Resource Management	
Assessment Year 2005	FY 2007 Program Assessment Rating Tool - Land Use Planning	1.4 Is the Program Design Free of Major Flaws that would limit the program's effectiveness or efficiency? Explanation: The Planning Program is designed to monitor, evaluate, and amend land use plan decisions in a continuous cycle to ensure that the land use plan decision framework is up-to-date. BLM state and local offices, in coordination with other BLM resource programs, are ultimately responsible for implementing approved land use plans through activity level plans and subsequent on-the-ground actions. The Planning Program is also responsible for monitoring the implementation of land use plans, while the BLM's other programs are responsible for monitoring to ensure that actions are implemented as designed and are meeting the desired results. In recognition of the importance of monitoring, BLM has established a National Monitoring Strategy which is coordinated by an interdisciplinary committee involving various BLM programs. Planning is a key partner of this committee and works to help facilitate ensuring that effectiveness monitoring is an interdisciplinary effort and that actions are leading to goals/objectives.

OMB Direction Regarding Assessments, Inventories, and Monitoring

Date	Review	Finding/Direction
Assessment Year 2005	FY 2007 Program Assessment Rating Tool - Land Use Planning	2.3 Does the program have a limited number of specific annual performance measures that can demonstrate progress toward achieving the program's long-term goals? Explanation: The program has developed a measure relating to completed plans/amendments that may be used to demonstrate progress toward achieving the program goal of completing and maintaining up-to-date land use plans. However, the planning program does not have an annual measure that ties back to a long term measure related to implementation effectiveness.
Assessment Year 2005	FY 2007 Program Assessment Rating Tool - Land Use Planning	2.8 Has the program taken meaningful steps to correct its strategic planning deficiencies? Explanation: BLM has recently recognized the need for the Planning Program to serve a greater role in coordinating the collection, reporting, and analysis of monitoring data among BLM's many programs. To this end, the agency has established a Monitoring Coordinator position within the Planning Program. This position facilitates the interdisciplinary committee that coordinates BLM's National Monitoring Strategy. Better coordination will help improve BLM's monitoring information base. Effective monitoring will help ensure that BLM leadership and managers have all of the information necessary to: 1) effectively prioritize land use planning efforts across geographic areas, 2) evaluate the effectiveness of completed plans, and 3) establish more meaningful resource protection goals and track progress toward those goals over time. However, BLM still needs to develop additional annual and long term outcome measures for the program. DOI will work with OMB to identify additional long-term and annual measures to better gauge the performance of the program in the future.

OMB Direction Regarding Assessments, Inventories, and Monitoring

Date	Review	Finding/Direction
December, 2005	FY 2007 Passback	Land Use Plan Monitoring: OMB has supported past BLM-requested funding increases for monitoring to improve baseline data and understanding of the impacts of various resource uses as well as BLM actions. This included funding within BLM's land use planning budget as well as funding specific to the Departmental hazardous fuels reduction program. A lack of understanding of resource conditions was a weakness identified in the 2004 PART on BLM's restoration programs. Although some progress has been made, BLM has yet to present a clear plan for how it would conduct this monitoring. BLM needs to make development of a comprehensive plan for prioritizing monitoring needs an agency priority. The agency should work with OMB to identify base funds that may be consolidated to improve collection, management, reporting, dissemination, and use of monitoring data. BLM should provide a status report to OMB by January 9, 2006 with a detailed plan describing: 1) the type and extent of monitoring data that local land units are to collect and methods for collecting these data, and 2) how the agencies will collect, store, analyze, and disseminate information on monitoring results for use in management decisions. In particular, OMB is interested in land health data that can be "rolled up" to the national level and in the amount and quality of information that is accessible to the public through BLM's website. (December 2005)
November, 2004	FY 2006 Passback	Monitoring is another component in evaluating fuels treatment effectiveness. OMB supported funding for increased monitoring within the fuels program (\$8 million in the FY 2005 budget), but DOI has yet to adequately explain what exactly this funding would accomplish. To ensure that monitoring funds are effectively spent, DOI should report to OMB by March 1st, 2005 on 1) the type and extent of monitoring data that local land units are to collect and methods for collecting these data, and 2) how the agency will collect, store, analyze, and disseminate information on monitoring results for use in management decisions.

OMB Direction Regarding Assessments, Inventories, and Monitoring

Date	Review	Finding/Direction
November, 2003	FY 2005 Passback	\$3 million of Land Use Plan Monitoring across BLM's programs to improve baseline data and understanding of the impacts of various resource uses as well as BLM actions. An additional \$1 million should be redirected from land use plan development to provide a total of \$4m for this project. A lack of understanding of resource conditions was a weakness identified in the 2004 PART on BLM's restoration programs. While OMB supports additional emphasis on monitoring, we are concerned that, as with the hazardous fuels program, BLM should develop a comprehensive plan for prioritizing monitoring needs and should work with OMB to identify base funds that may be consolidated to improve management, reporting, dissemination, and use of monitoring data. BLM should report to OMB by January 9, 2004 with an initial plan describing: 1) the type and extent of monitoring data that local land units are to collect and methods for collecting these data, and 2) how the agencies will collect, store, analyze, and disseminate information on monitoring results for use in management decisions. OMB expects that this information will be used justify the funding increase in BLM's FY 2004 Congressional Justifications. DOI should then work with OMB to develop a more detailed final report by March 1, 2004 However, OMB remains concerned that WUI funds are not being used effectively as possible, a view supported by a GAO review as recently as August. OMB supports the DOI proposal to increase monitoring within the fuels program, but believes that this is a basic management component that should have been funded adequately from the outset of the program. As such, only \$1.7m in additional funds is provided, but Passback assumes that DOI will set aside a minimum of \$5m within the program in FY 2005 to support program monitoring work. DOI has not yet presented a clear plan for how it would begin this monitoring. To ensure that monitoring funds are effectively spent, DOI and USDA should report to OMB by January 16, 2004 on 1) the type and extent of monitoring data that local land units are to collect and methods for collecting these data, and 2) how the agencies will collect, store, analyze, and disseminate information on monitoring results for use in management decisions.

OMB Direction Regarding Assessments, Inventories, and Monitoring

Date	Review	Finding/Direction
December, 2002	FY 2004 Passback	\$1.9m for improved monitoring of resource conditions across BLM's programs to improve baseline data and understanding of the impacts of various resource uses as well as BLM actions. A lack of understanding of resource conditions was a weakness identified in the recently completed PART on BLM's restoration programs. OMB encourages BLM to develop a comprehensive plan for prioritizing monitoring needs and to consider additional reallocation of base funding to meet these needs.
December, 2002	FY 2004 PART - Resource Protection	Findings were used to justify budget increase that funded the AIM Strategy. However some weaknesses were identified in the assessment. These include: 1. Gaps in monitoring of resource conditions to support management decisions and to assess the impacts of restoration activities. 2. A lack of program performance measures that focus on efficiency. 3. Insufficient data on existing performance measures to ensure that baseline data is accurate and performance targets are aggressive. 4. Significant similarities and potential overlaps between activities conducted in BLM's restoration programs and in the Department's wildland fire management program for rehabilitation and fuels reduction. Based on these findings, the Administration will: 1. Provide an additional \$2 million in 2004 for BLM monitoring activities to improve baseline data and track trends over time. 2. Refine existing performance measures and develop consistent efficiency measures across the Department for similar restoration activities. 3. Evaluate options for more clearly distinguishing between restoration activities funded with the Department's wildland fire program and BLM's operating programs.

Case Studies Report on the Impact of the 2004 Indian Ocean Tsunami

Date	Review	Findings/Conclusions	Review	Date
December 2004	The first review was conducted in December 2004, following the initial impact of the tsunami. The review focused on the immediate needs of the affected communities and the role of the international community in providing relief. The findings of the review indicated that the immediate needs of the affected communities were met, but that there were significant gaps in the provision of long-term relief and reconstruction. The review also identified the need for a coordinated approach to the relief effort, involving all stakeholders. The conclusions of the review were that the international community had responded quickly and effectively to the immediate needs of the affected communities, but that there was a need for a more coordinated and sustainable approach to the relief effort.	The first review was conducted in December 2004, following the initial impact of the tsunami. The review focused on the immediate needs of the affected communities and the role of the international community in providing relief. The findings of the review indicated that the immediate needs of the affected communities were met, but that there were significant gaps in the provision of long-term relief and reconstruction. The review also identified the need for a coordinated approach to the relief effort, involving all stakeholders. The conclusions of the review were that the international community had responded quickly and effectively to the immediate needs of the affected communities, but that there was a need for a more coordinated and sustainable approach to the relief effort.	December 2004	
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